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Ontario. Legislative Assembly

SESSIONAL PAPERS.

VOL. XXX.—PART IV.

FOURTH SESSION, EIGHTH LEGISLATURE

OF THE

PROVINCE OF ONTARIO.

SESSION 1897-8.

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1898.

LIST OF SESSIONAL PAPERS.

ARRANGED ALPHABETICALLY.

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" " Purchase money	65	*Printed.*
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Algonquin Park, Sales of Jewellery in	51	*Not printed,*
Asylums, Report	10	*Printed.*
Bee-Keepers' Associations, Report	21	*Printed.*
Births, Marriages and Deaths, Report	29	"
Blind Institution, Report	14	"
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Canadian Niagara Power Company, Agreement	48	*Not printed.*
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" " mining concessions	47	*Not printed.*
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Spraying, Report	49	"
Statutes, Report *re* Consolidation	42	*Not printed.*
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LIST OF SESSIONAL PAPERS.

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No. 1.. Report of the Minister of Education of the year 1897, with the Statistics of 1896. Presented to the Legislature 16th December, 1897. *Printed.*

No. 2.. Public Accounts of the Province for the year 1897. Presented to the Legislature 8th December, 1897, and 10th January, 1898. *Printed,*

No. 3... Estimates for the year 1898. Presented to the Legislature 10th December, 1897. *Printed.* Estimates (supplementary) for the year 1898. Presented to the Legislature 12th January, 1898. *Printed.* Estimates (vote of credit). Presented to the Legislature 20th December, 1897. *Not Printed.*

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No. 4. Report of the Commissioner of Crown Lands for the year 1897. Presented to the Legislature 13th January, 1898. *Printed.*

No. 5.. Report of the Department of Immigration for the year 1897. Presented to the Legislature 13th January, 1898. *Printed.*

No. 6.. Report of the Inspector of Division Courts for the year 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 7.. Report on the working of the Tavern and Shop Licenses Acts for the year 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 8... Report of the Commissioner of Public Works for the year 1897. Presented to the Legislature 12th January 1898. *Printed.*

No. 9.. Report of the Inspector of Insurance and Registrar of Friendly Societies for the year 1897. Presented to the Legislature 9th December, 1897. *Printed.*

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No. 10.. Report upon the Lunatic and Idiot Asylums for the Province for the year ending 30th September, 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 11.. Report upon the Common Goals, Prisons and Reformatories of the Province for the year ending 30th September, 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 12.. Report upon the Houses of Refuge and Orphan and Magdalen Asylums of the Province for the year ending 30th September, 1897. Presented to the Legislature 12th January, 1898. *Printed.*

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No. 13.. Report upon the Hospitals of the Province for the year ending 30th September, 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 14.. Report upon the Institution for the Education of the Blind, Brantford, for the year ending 30th September, 1897. Presented to the Legislature 9th December, 1897.

No. 15.. Report upon the Institution for the Education of the Deaf and Dumb, Belleville, for the year ending 30th September, 1897. Presented to the Legislature 9th December, 1897. *Printed.*

No. 16.. Report of the Work under the Children's Protection Act for the year 1897. Presented to the Legislature 13th January, 1898. *Printed.*

No. 17.. Report of the Ontario Agricultural College and Experimental Farm for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

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No. 18.. Report of the Fruit Growers' Association of Ontario for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 19.. Report of the Fruit Experiment Stations of Ontario for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 20.. Report of the Entomological Society of Ontario for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 21.. Report of the Bee Keepers' Association for the Province for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 22.. Report of the Poultry and Pet Stock Associations of the Province for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

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No. 23.. Report of the Provincial Instructor in Road making in Ontario for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 24.. Report of the Butter and Cheese Associations of the Province for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 25.. Report of the Live Stock Associations of the Province for the year 1897 Presented to the Legislature 10th January, 1898. *Printed.*

No. 26.. Report of the Superintendent of Farmers' Institutes of the Province for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 27.. Report of the Inspectors of Factories for the Province for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 28.. Report of the Inspector of Legal Offices for the year 1897. Presented to the Legislature 12th January, 1898. *Printed.*

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No. 29.. Report upon the Registration of Births, Marriages and Deaths in the Province for the year 1896. Presented to the Legislature 12th January, 1898. *Printed.*

No. 30.. Report of the Ontario Game and Fish Commission. Presented to the Legislature 10th January, 1898. *Printed.*

No. 31.. Report of the Commissioners for the Queen Victoria Niagara Falls Park for the year 1897. Presented to the Legislature 14th January, 1898. *Printed.*

No. 32.. Report of the Bureau of Industries for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

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No. 33.. Report of the Bureau of Mines for the year 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 34.. Report of the Clerk in charge of the Forestry Branch, Crown Lands Department. Presented to the Legislature 11th January, 1898. *Printed.*

No. 35.. Report of the Board of Health for the year 1897. Presented to the Legislature 10th January, 1898. *Printed.*

No. 36.. Report of the Financial Statements made by Loan Corporations for the year 1897. Presented to the Legislature 10th January. 1898. *Printed.*

No. 37.. Report of Standing Committee on Finance, Toronto University, for the year 1897-98. Presented to the Legislature 20th December, 1897. *Printed.*

No. 38.. Auditor's Report on Capital and Income Accounts, Toronto University for the year ending 30th June, 1897. Presented to the Legislature 9th December, 1897. *Printed.*

No. 39.. Copy of an Order in Council directing the payment out of the Surplus Surrogate fees of $500 to His Honour Judge Mosgrove. Presented to the Legislature 9th December, 1897. *Not Printed.*

No. 40.. Reports of the Principal, and Statements of Bursar of Upper Canada College, shewing receipts and expenditures 1896-97. Presented to the Legislature 16th December, 1897. *Not Printed.*

No. 41.. Return to an Order of the House of the 13th day of December, 1897, for a Return shewing the value of the hogs which died, or were slaughtered at the Humber piggery during the outbreak of cholera in July, 1896. Presented to the Legislature 16th December, 1897. Mr. *St. John. Not Printed.*

No. 42.. Report of the Commissioners appointed to revise and consolidate the Public Statutes of the Province. Presented to the Legislature 23rd December. 1897. *Not Printed.*

No. 43.. Report of the Provincial Municipal Auditor for the year ending 30th November, 1897. Presented to Legislature 28th December, 1897. *Printed.*

No. 44.. Return to an Order of the House of the thirty-first day of March, 1897, for a Return shewing the expenditure on Colonization Roads, Bridges and other Roads in the Province for the last five years, shewing in each case the Electoral District or Districts in which each of the said Colonization Roads, Bridges and other Roads was situated. Presented to the Legislature 30th December, 1897. Mr. *Little. Not printed.*

No. 45.. Report of the Forestry Commissioners, Preliminary. Presented to the Legislature 4th January, 1898. *Printed.*

No. 46.. Return to an Address to His Honour the Lieutenant-Governor of the seventeenth day of December, 1897, praying that he will cause to be laid before the House a copy of the Petition presented to the Lieutenant-Governor in Council asking for an Audit of the Books, Vouchers, etc, of the Township of Manvers. A copy of the Commissioner's original report, together with his supplementary report. Also copies of all correspondence in connection with the matter. Presented to the Legislature 6th January, 1898. Mr. *Willoughby. Not printed.*

No. 47.. Return to an Order of the House of the thirteenth day of December, 1897, for a Return of copies of all correspondence, papers and documents between the Government, or any Department thereof, and all parties who have made application for mining concessions of a similar nature to those now enjoyed by the Engledue Syndicate under agreement with the Government; or any other concessions not now provided for by or within the provisions of the present Mining Act. Presented to the Legislature 6th January, 1898. Mr. *St. John.* *Not printed.*

No. 48.. Return to an Order of the House of the twenty-second day of December, 1997, for a copy of the Agreement entered into between the Commissioners of the Queen Victoria Niagara Falls Park and the Niagara Falls Electric Railway Company and the Canadian Niagara Power Company for the use of the surplus power of the said Railway Company in the generation of electricity. Presented to the Legislature 6th January, 1898. Mr. *German.* *Not printed.*

No 49.. Report of the Superintendent of Spraying, Ontario, for the year 1897 Presented to the Legislature 10th January, 1898. *Printed.*

No. 50.. Copy of an Order in Council amending the Regulations respecting the shooting and taking of wild duck and other water fowl in the waters within two miles of Rondeau Provincial Park in Rondeau Harbor. Presented to the Legislature 11th January, 1898. *Not printed.*

No. 51.. Copy of an Order in Council respecting the sale of watches, jewellery or other goods of a like kind in Algonquin National Park. Presented to the Legislature 11th January, 1898. *Not printed.*

No. 52.. Report of the Agricultural and Experimental Union for the year 1897. Presented to the Legislature 12th January, 1898. *Printed.*

No. 53.. Return to an Order of the House of the twenty-second day of December last for a Return of copies of papers, documents and all correspondence between any member or officer of the Government and any other person or persons in reference to Lot No. 13, Concession 3, Township of Stisted. Presented to the Legislature 12th January, 1898. Mr. *Langford.* *Not printed.*

No. 54.. Return to an Order of the House of the twenty-ninth day of December last for a return of copies of all correspondence between the Commissioner of Crown Lands, or any official of the Department, and any person or persons in reference to the cutting of timber under license or trespass in the tract of land known as "Coffin" Addition. Presented to the Legislature 12th January, 1898. Mr. *Miscampbell.* *Not printed.*

No. 55.. Return to an Order of the House of the sixth day of January, 1898, for a Return shewing all payments made to Captain John Sullivan, an *employee* of the Government since January 1st, 1897, and shewing the time list since that date, where he was employed and amount received since that time. Such Return to state if paid by month, year, fees or day wages. Presented to the Legislature 12th January, 1898. Mr. *Reid* (Addington). *Not printed.*

No. 56.. Report of the Secretary and Registrar of the Province for the year 1897. Presented to the Legislature, 12th January, 1898. *Printed.*

No. 57.. Return of all Fees and Emoluments received by the Registrars of Deeds of the Province for the year 1897. Presented to the Legislature, 12th January, 1898. *Printed.*

No. 58.. Documents *re* the Manufacture, in Canada, of Pine Timber cut on the Crown Domain. Presented to the Legislature, 12th January, 1898. *Printed*

No. 59.. Return to an Order of the House of the twenty-second day of December last for a Return of copies of all papers, documents and correspondence between the Government, or any Department thereof, and any other person, persons or corporations in any way relating to the dealings of the Moore Lumber Company with the Crown Lands Department or with the Government; together with a full return of copies of the evidence taken at the investigation of the said Company's dealings with the Government, or any Department thereof, and of all other documents and correspondence in connection therewith, as well as a copy of the report and finding of the Commissioners appointed to investigate the same. Presented to the Legislature, 12th January, 1898. Mr. *St. John.* *Not printed.*

No. 69.. Report on the Immigration of British Children. Presented to the Legislature, 13th January, 1898 *Printed.*

No. 61.. Account of the Official Guardian *ad litem*, for the year 1897. Presented to the Legislature, 13th January, 1898. *Not printed.*

No. 62.. Return of an Order of the House of the thirty-first day of March, 1897, for a Return shewing how many acres of land are contained in the "Farm Proper" at the Ontario Agricultural College, and how many horses, cattle, sheep and pigs were kept on the farm in the year 1896. Shewing as well, if the farm produced sufficient food or fodder to maintain the stock for the whole year And shewing how much it cost, over and above what was raised on the farm, to maintain the stock for the year. Presented to the Legislature, 13th January, 1898. Mr. *Haggerty.* *Not printed.*

No. 63.. Return to an Order of the House of the eighth day of March, 1897, for a Return shewing the business done during each of the years 1892, 1893, 1894, 1895 and 1896 in the following Court in this Province, namely:—1. The High Court of Justice: (1) The number of writs issued out of the High Court of Justice in each of the above years: (2) The number of Records entered for trial of the said years; (3) The number of cases set down for appeal to the Divisional Courts of the High Court in each of the above years; (4) The number of cases set down for appeal to the Court of Appeal for each of the above years; (5) The number of cases appealed to the Supreme Court at Ottawa for each of the above years. 2. The County Courts: (1) The number of writs issued out of the County Courts of the Counties of the Province in each of the above years; (2) The number of Records entered for trial in the County Courts of this Province in each of the above years: (3) The number of County Court cases set down for appeal from the said County Courts to the Court of Appeal in each of the above years. 3. The Division Courts: (1) The Number of writs issued in the Division Courts of this Province in each of the said years; (2) The number of cases tried in the Courts in each of the said years; (3) The number of appeals taken from the Division Courts to a higher Court in each of the above years; (4) The number of Judgments by default entered during each of the above years in the Division Courts. Presented to the Legislature, 13th January, 1898. Mr. *Marter.* *Not printed.*

No. 64.. Report of the Commission appointed to enquire into the matter relative to the price of School Books, etc. Presented to the Legislature, 14th January, 1889. *Printed.*

No. 65.. Return to an Order of the House of the twenty-fourth day of March, 1897, for a return shewing the cost of, or purchase money paid for the Ontario Agricultural College; acreage of the property, together with the amount of land now under cultivation; expenditure thereon, since its establishment, upon buildings, stock, fencing, drainage and all other accounts. Together with receipts from students in fees, sale of stock, produce and other sources. Presented to the Legislature, 14th January, 1898. Mr. *Willoughby.* *Printed.*

No. 66.. Return to an Order of the House of the fourteenth day of January, 1898, for a Return of copies of all correspondence or reports in the possession of the Government respecting the operations of the Engeldue Syndicate during the past season on the locations or concessions granted at the beginning of the year. Presented to the Legislature, 14th January, 1898. Mr. *Dickenson.* *Printed.*

TWENTY-EIGHTH ANNUAL REPORT

OF THE

INSPECTOR OF PRISONS AND PUBLIC CHARITIES

UPON THE

HOSPITALS

OF THE

PROVINCE OF ONTARIO.

BEING FOR THE YEAR ENDING 30TH SEPTEMBER,

1897.

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:

WARWICK BRO'S & RUTTER, PRINTERS AND BOOKBINDERS, 68 AND 70 FRONT ST. WEST.

1898.

Office of the
Inspector of Prisons and Public Charities, Ontario,
Parliament Buildings, Toronto, December, 1897.

Sir.—I have the honor to transmit herewith, to be presented to His Honor the Lieutenant-Governor, the Twenty-Eighth Annual Report upon the Hospitals, for the official year ending 30th September, 1897.

I have the honor to be, Sir,
Your obedient servant,

T. F. CHAMBERLAIN,
Inspector.

The Honorable E. J. Davis, M.P.P.,
Secretary of the Province of Ontario,
Toronto.

HOSPITALS.

TWENTY-EIGHTH ANNUAL REPORT

OF THE

INSPECTOR OF PRISONS AND PUBLIC CHARITIES

OF THE

PROVINCE OF ONTARIO.

PARLIAMENT BUILDINGS,
TORONTO, December, 1897.

To the Honourable SIR OLIVER MOWAT, *Knight Commander of the Order of St. Michael and St. George, Member of the Queen's Privy Council for Canada, and Lieutenant-Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOR:

I beg to submit herewith the Twenty-Eighth Annual Report upon the Hospitals of Ontario, being for the official year ending on the 30th September, 1897.

I have the honor to be,
Your Honor's most obedient servant,

T. F. CHAMBERLAIN,
Inspector.

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HOSPITALS.

During the past year the following hospitals have been placed upon the list entitled to receive Government aid, viz.:

General Hospital, Sarnia.

Western Hospital, Toronto.

Huntsville Hospital.

This year there are five hospitals making application to be placed upon the list, viz.:

Royal Victoria Hospital, Barrie.

Hotel Dieu Hospital, Cornwall.

General Hospital, Rat Portage.

Sanatorium for Consumptives, Gravenhurst.

St. Joseph's Hospital, Sudbury.

and two more which are nearly completed will also make application for aid, viz.:

General Hospital, Cornwall.

St. Luke's Hospital, Ottawa.

I have, as provided by statute, inspected all the hospitals of the Province during the past year, and found them doing good work in providing for the care and medical treatment of those who have been so unfortunate as to require being placed in such institutions.

Many of the hospitals have been much improved in their sanitary condition and conveniences, and in special buildings provided for special diseases.

The Government continues the appropriation of a liberal sum towards the maintenance of these institutions which should stimulate the efforts of communities and private individuals to contribute more largely to their support. Al c asse s—those who are wealthy, and those who are not able to pay anything—

are cared for and furnished with the best medical advice and treatment in all the hospitals. Each of these institutions has a good medical staff, and is well supplied with trained nurses, and those in training.

There is still a disposition to multiply hospitals in some localities where one hospital would be quite sufficient to do all the work. This should be absolutely prevented by legislation of a more stringent character. The total number of hospitals now receiving provincial aid is 43, all of which receive their proportion of the Government grant, which this year amounted to $110,000.

The total number of patients treated in hospitals during the past year was 19,617, as compared with 17,517 the year previous. In addition to this number of patients, thousands of out-door patients have been treated by the various hospitals during the year. The number of deaths for the same period was 1,100, as compared with 1,042 the previous year. The total days' stay of patients in hospitals during the past year was 523,247, as compared with 496,603 the previous year. The total receipts from all sources, other than the Government grant; for the past year were $362,623, as compared with $311 727 the previous year, being an increase of over $50,000. This indicates that the people of the province are ably supporting these institutions in their charitable work.

It will be noticed by the tables that the average cost of patients for the year is somewhat less than in previous years.

In the minutes of inspection of the hospitals will be found full details regarding the buildings, grounds, patients, etc.

The Tables numbered I. to X. will be found in the following pages, and following them are the separate reports upon each of the hospitals, which give full information as to the movements of patients, the sanitary and other conditions of the respective institutions.

The following comparative statement shows the numbers treated in all the hospitals in each of the past sixteen years, with the increase or decrease in each successive year as the case may be:

		Increase.	Decrease.
1878	4,372	295	..
1879	4,612	240	..
1880	5,302	690	..
1881	4,257	..	45
1882	6,032	775	..
1883	6,238	206	..
1884	6,369	131	..

		Increase.	Decrease.
1885	6,617	248	..
1886	7,035	418	..
1887	7,522	487	..
1888	8,292	770	..
1889	8,561	269	..
1890	9,187	626	..
1891	10,523	1,336	..
1892	11,404	881	..
1893	12,392	988	..
1894	14,363	1,971	..
1895	16,161	1,798	..
1896	17,517	1,356	..
1897	19,617	2,100	..

TABLE I.—Shewing the general movement of Patients in each Hospital separately.

Hospitals.	Location.	Number remaining under treatment on 1st Oct., 1896.	Number admitted during the year ending 30th Sept, 1897.	Number of births in Hospitals during the year.	Total number under treatment during the year ending 30th Sept., 1897.	Number discharged during the year.	Number who died during the year.	Number remaining under treatment on 30th Sept., 1897.
General Hospital (including the Burnside Lying-in Branch, and the Mercer Eye and Ear Infirmary Branch)	Toronto	255	2,584	137	2,976	2,536	180	260
Grace (Homœopathic) Hospital	"	46	672	83	801	717	36	48
Hospital for Sick Children	"	92	470		562	451	25	86
St. Michael's Hospital	"	112	1,252	51	1,415	1,181	101	133
City Hospital	Hamilton	70	928	44	1,042	894	73	75
St. Joseph's Hospital	"	27	381		408	360	15	33
General Hospital	Kingston	72	1,208	48	1,328	1,222	40	66
Hotel Dieu Hospital	"	56	824		880	775	35	70
General Protestant Hospital	Ottawa	53	676		729	625	44	60
Roman Catholic Hospital	"	59	945		1,004	857	77	70
House of Mercy Lying-in Hospital	"	32	189	164	385	345	10	30
General Hospital	London	55	761	26	842	722	65	55
St. Joseph's Hospital	"	29	336		365	335	20	10
General and Marine Hospital	St. Catharines	17	321	11	349	303	28	18
Galt Hospital	Galt	19	265	4	288	253	16	19
General Hospital	Guelph	42	476	20	538	479	29	30
St. Joseph's Hospital	"	35	265		300	260	17	23
General Hospital	Pembroke	31	261		292	257	9	26
General Hospital	Mattawa	18	253		271	252	8	11

J. H. Stratford Hospital	Brantford	21	250	11	282	225	34	23
St. Joseph's Hospital	Port Arthur	11	109		120	105	8	7
Belleville Hospital	Belleville	13	246	6	265	230	15	20
St. Vincent De Paul Hospital	Brockville	15	344		359	320	14	25
General Hospital	"	26	392	10	428	380	18	30
General and Marine Hospital	Collingwood	5	59		64	58	2	4
Nichol's Hospital	Peterborough	32	244	1	269	236	15	18
St. Joseph's Hospital	"	18	203		221	195	13	13
Hotel Dieu Hospital	Windsor	13	234		247	210	13	24
St. Joseph's Hospital	Chatham	15	262	2	279	230	21	28
General Hospital	Stratford	19	175	11	205	169	13	23
Amasa Wood Hospital	St. Thomas	9	122	9	140	120	11	9
General and Marine Hospital	Owen Sound	9	91	2	102	78	8	16
Sick Children's Hospital	Ottawa	6	67		73	62	3	8
General Hospital	Chatham	19	201	12	232	202	11	19
General Hospital	Sudbury	8	97	1	106	96	7	3
General Hospital	Huntsville	10	92	5	107	105		2
Woodstock Hospital	Woodstock	20	109	1	130	108	14	8
Berlin and Waterloo Hospital	Berlin	14	100	1	115	98	13	4
Maternity Hospital	Ottawa	7	61	49	117	110	4	3
Huntsville Hospital	Huntsville		344		360	343	10	7
General Hospital	Sarnia		167	8	175	144	12	19
Western Hospital	Toronto		239	5	255	224	10	21
St. Joseph's Hospital	Sudbury		191		191	178	3	10
Total, 1897		1,410	17,466	722	19,617	17,050	1,100	1,467
Total, 1896		1,308	15,669	540	17,517	15,065	1,042	1,410

TABLE II.—Shewing Sex, Religious Denominations and Nationalities of Patients under treatment in the various Hospitals.

Hospitals.	Location.	Sex		Religious denominations.			Nationalities.					
		Male.	Female.	Protestants of all denominations.	Roman Catholics.	Unknown.	Canadian.	English.	Irish.	Scotch.	United States.	Other countries.
General Hospital	Toronto	1,592	1,384	2,699	247	30	1,775	650	256	145	88	62
Grace (Homœopathic) Hospital	"	262	539	744	40	17	426	246	47	48	20	14
Hospital for Sick Children	"	311	251	492	62	8	490	49	9	6	1	7
St. Michael's Hospital	"	752	663	520	888	7	822	175	295	25	54	44
City Hospital	Hamilton	517	525	836	171	35	587	213	104	56	47	35
St. Joseph's Hospital	"	158	250	248	160	.....	238	73	44	16	25	12
General Hospital	Kingston	585	743	1,183	143	2	1,172	67	52	24	10	3
Hotel Dieu Hospital	"	406	474	229	651	.....	616	80	149	12	20	3
General Protestant Hospital	Ottawa	389	340	557	103	69	492	93	56	24	13	51
Roman Catholic Hospital	"	488	516	20	984	.....	835	20	77	10	14	48
House of Mercy Lying-in Hospital	"	76	309	101	284	.....	163	62	109	41	.....	10
General Hospital	London	438	404	744	83	15	546	163	61	32	20	20
St. Joseph's Hospital	"	138	227	214	151	.....	277	21	26	7	12	22
General and Marine Hospital	St. Catharines	174	175	263	86	.....	237	46	33	7	18	8
Galt Hospital	Galt	116	172	266	22	.....	229	30	1	12	7	9
General Hospital	Guelph	261	277	505	32	1	418	49	23	30	8	10
St. Joseph's Hospital	"	129	171	74	226	.....	226	18	30	10	6	10
General Hospital	Pembroke	136	156	79	213	.....	213	23	48	8	.....	....
General Hospital	Mattawa	203	68	19	252	.....	212	9	47	.....	.....	3

J. H. Stratford Hospital	Brantford	154	128	250	32	.....	182	43	29	12		7
St. Joseph's Hospital	Port Arthur	102	18	58	44	18	56	15	17	10	2	20
Belleville Hospital	Belleville	119	146	219	45	1	200	34	14	8	5	4
St. Vincent De Paul Hospital	Brockville	135	224	115	244	.... ..	270	14	29	23	13	10
General Hospital	"	160	268	412	16	.....	362	14	10	11	31	....
General and Marine Hospital	Collingwood	29	35	58	6	.....	42	9	5	4	4	.....
Nichol's Hospital	Peterborough	142	127	260	8	1	193	44	10	8	14	.....
St. Joseph's Hospital	"	104	117	23	198	.. ....	142	4	45	.....	1	29
Hotel Dieu Hospital	Windsor	96	151	62	185	.....	174	22	19	.....	21	11
St. Joseph's Hospital	Chatham	120	159	159	120	.....	236	14	12	.....	10	7
General Hospital	Stratford	104	101	171	31	3	133	20	23	11	10	8
Amasa Wood Hospital	St. Thomas	74	66	130	10	.....	86	27	12	5	8	2
General and Marine Hospital	Owen Sound	59	43	96	6	.....	96	3	1	1	1	....
Sick Children's Hospital	Ottawa	33	40	60	13	.....	65	5	.....	.....	.....	3
General Hospital	Chatham	104	128	218	14	.....	176	10	12	9	25	.....
General Hospital	Sudbury	102	4	69	36	1	84	8	1	2	3	8
General Hospital	Huntsville	93	14	83	23	1	88	10	4	1	2	2
Woodstock Hospital	Woodstock	63	67	123	5	2	95	25	4	3	1	2
Berlin and Waterloo Hospital	Berlin	53	62	92	23	.....	72	5	1	1	3	33
Maternity Hospital	Ottawa	23	94	92	25	.....	94	9	3	5	5	1
Huntsville Hospital	Huntsville	296	64	293	67	.....	127	72	64	37	35	25
General Hospital	Sarnia	83	92	164	11	.....	122	17	8	15	11	2
Western Hospital	Toronto	92	163	227	5	23	168	57	21	1	4	4
St. Joseph's Hospital	Sudbury	176	15	58	133	... ..	161	11	8	2	5	4
Total, 1897		9,647	9,970	13,285	6,098	234	13,398	2,579	1,819	682	586	553
Total, 1896		8,926	8,591	11,744	5 574	199	11,710	2,446	1,811	571	466	513

TABLE III.

Detailed analysis of the diseases or ailments for which patients received treatment for the year ending 30th September, 1897.

Disease.	Male.	Female.	Total.
Alimentary Canal.			
Colic	17	16	33
Constipation	29	34	63
Dysentery	51	38	89
Diarrhœa	49	27	76
Dyspepsia	128	114	242
Enteritis	23	31	54
Fistula-in-ano	53	21	74
Gastrodynia	3	5	8
Gastritis	110	90	200
Hæmorrhoids	92	79	171
Hœmatemesis	10	10	20
Intestinal worms	15	7	22
Esophagus (diseases of)	12	6	18
Pharyngitis	12	14	26
Ptyalism	1	....	1
Peritonitis	54	79	133
Quinsy	22	24	46
Stomatitis	18	17	35
Tonsillitis	94	98	192
Typhlitis	50	14	64
Ulceration of stomach	35	54	89
Appendicitis	103	55	158
Brain and Nervous System.			
Apoplexy	35	14	49
Chorea	14	32	46
Catalepsy	1	5	6
Concussion of brain	22	11	33
" spine	4	2	6
Compression of brain	18	7	25
" spine	3	3	6
Delirium tremens	87	9	96
Epilepsy	43	22	65
Hemiplegia	22	15	37
Hysteria	34	140	174
Inflammation of brain	17	10	27
Insolation	17	1	18
Insomnia	21	19	40
Insanity	33	40	73
Locomotor Ataxia	15	10	25
Myelitis	2	4	6
Neuralgia	70	95	165
Neuroma	6	10	16
Paralysis, general	41	19	60
Paraplegia	33	13	46
Paralysis agitans	4	4	8
Softening of brain	9	6	15
Spina bifida	1	5	6
Brain and Nervous System.—Continued.			
Sciatica	56	42	98
Spinal curvature	57	83	140
Tubercular meningitis	19	15	34
Tetanus	2	3	5
Neurasthenia	25	65	90
Bones.			
Anchylosis	29	13	42
Caries	32	16	48
Exostosis	9	10	19
Necrosis	103	36	139
Ostitis	12	5	17
Periostitis	26	22	48
Rickets	4	1	5
Circulation.			
Angina pectoris	3	5	8
Aneurisms	7	3	10
Atheroma of vessels	29	10	39
Cyanosis	1	2	3
Disease of aortic valves	27	21	48
" mitral valves	79	72	151
" tricuspid valves	2	1	3
" pulmonary artery	15	10	25
Endocarditis	21	30	51
Heart, dilation of	17	15	32
" hypertrophy	23	19	42
" degeneration	7	6	13
Nævus	4	5	9
Pericarditis	17	9	26
Phlebitis	13	14	27
Phlegmasia dolens	....	3	3
Varicose veins	65	58	123
Dislocations.			
Ankle	14	9	23
Bones of the hand	6	2	8
" foot	10	2	12
Clavical	7	6	13
Elbow	19	4	23
Femur	5	5	10
Humerus	18	6	24
Knee	14	5	19
Lower maxilla	2	1	3
Petella	3	1	4
Wrist	4	3	7

TABLE III.—*Continued.*

Disease.	Male.	Female.	Total.
Ear.			
Cophosis	2	6	8
Otorrhœa	15	14	29
Otitis media	32	37	69
Eye.			
Amarosis	2	2	4
Amblyophia	1	....	1
Blepharospasmus	....	1	1
Cataract	91	80	171
Entropion	2	13	15
Ectropion	4	6	10
Foreign body in the eye	14	7	21
Glaucoma	6	5	11
Iritis	48	16	64
Keratitis	13	10	23
Leucoma	3	3	6
Ophthalmia	29	35	64
" catarrhal	42	9	51
" purulent	5	6	11
" granular	29	19	48
" gonorrhœal	5	6	11
Pterygium	10	3	13
Retinitis	5	4	9
Sclerotitis	1	....	1
Staphyloma	2	4	6
Strabismus	13	23	36
Trichiasis ciliorum	.....	.....	.....
Ulcer of cornea	35	22	57
Fractures.			
Bones of the head and face	49	10	59
" hand	30	4	34
" foot	23	8	31
" pelvis	12	4	16
Clavical	30	12	42
Femur	57	20	77
Fibula	37	6	43
Humerus	32	8	40
Patella	7	...	7
Ribs	46	20	66
Radius	44	21	65
Scapula	8	1	9
Sternum	.....	.....	.....
Tibia	86	13	99
Ulna	10	4	14
Vertibra	5	....	5
Liver.			
Abscess of liver	14	9	23
Acute atrophy of liver	6	4	10
Cirrhosis	21	7	28
Fatty liver	1	5	6
Gall stones	32	28	60
Hepatitis	13	9	22
Hydatds of liver	.....	.....	.....
Jaundice	26	30	56
Waxy Liver	4	1	5
Nose and Face.			
Catarrh	37	27	64
Epulis	3	3	6
Epistaxis	23	23	46
Lipoma	1	..	1
Ozœna	7	3	10
Polypus	10	6	16
Poisons.			
Gases	5	7	12
Irritant	3	3	6
Lead poisoning	11	2	13
Narcotic	14	6	20
Narcoto-irritant	1	....	1
Respiratory Organs.			
Asthma	59	47	106
Bronchitis, acute	150	138	288
" chronic	39	53	92
Croup	12	12	24
Emphysema of lung	31	24	55
Empyema	40	18	58
Hydrothorax	8	1	9
Pneumonia	191	130	321
" pleuro	38	28	66
" typho	16	17	33
" broncho	29	29	58
Pleurisy	94	72	166
Phthisis	206	146	352
Pleurodynia	15	19	34
Tuberculosis	92	79	171
Spleen.			
Splenitis	5	7	12
Waxy spleen	1	....	1
Skin.			
Acne	3	11	14
Boils	19	9	28
Burns and Scalds	45	28	73

TABLE III.—*Continued.*

Disease.	Male.	Female.	Total.
Skin.—Continued.			
Chilblains	5	7	12
Carbuncle	11	6	17
Corns and Bunions	8	6	14
Elephantiasis	1	....	1
Eczema	117	53	170
Erythema	8	8	16
Frost bites	19	4	23
Herpes	8	4	12
Impetigo	3	6	9
Intertrigo	5	9	14
Lupus	9	4	13
Lichen	....	1	1
Onychia	8	3	11
Pruritus	5	6	11
Pediculi	3	1	4
Pityriasis	2	1	3
Psoriasis	11	4	15
Roseola	2	4	6
Rupia	7	5	12
Ringworm	13	8	21
Scabies	10	5	15
Sycosis	2	3	5
Urticaria	6	6	12
Whitlow	16	10	26
Urinary Organs.			
Bright's Disease, acute	51	18	69
" chronic	40	17	57
Balanitis	8	....	8
Bubo	30	7	37
Cystitis	100	69	169
Condyloma	3	8	11
Diabetes mellitus	24	8	32
" insipidus	3	1	4
Enlarged prostrate	65	....	65
Epididymitis	34	....	34
Gonorrhœa	87	51	138
Gleet	9	....	9
Hydrocele	41	3	44
Hæmatocele	3	3	6
Incontinence of urine	25	17	42
Pyelitis	14	5	19
Phymosis	50	....	50
Paraphymosis	11	....	11
Retention of urine	34	24	58
Supurative nephritis	18	10	28
Stricture	95	1	96
Spermatorrhœa	2	....	2
Urinary calculus	41	8	49
Floating kidney	5	7	12

Disease.	Male.	Female.	Total.
Women.			
Amenorrhœa	....	....	51
Abortion	....	....	43
Dysmenorrhœa	....	....	90
Erosion of os uteri	....	....	151
Fistula, recto-vaginal	....	....	23
" vesico-vaginal	....	....	12
Metritis and Endometritis	....	....	328
Menorrhagia	....	....	67
Ovarian disease	....	....	288
Parturition	....	....	606
Premature labor	....	....	20
Uterus, Anteversion of	....	....	24
" retroversion of	....	....	62
" anteflection of	....	....	21
" retroflection of	....	....	29
" inversion of	....	....	6
" prolapsus of	....	....	50
Womb, polypus of	....	....	38
" fribroid of	....	....	94
" cancer of	....	....	79
Lacerations	....	191	191
Stenosis of cervic	....	....	17
Puerpral convulsions	....	....	53
Zymotic and General.			
Anæmia	30	210	240
Anasarca	15	16	31
Chicken pox	9	3	12
Cholera, Asiatic	1	....	1
" morbus	3	1	4
" infantum	10	17	27
Chlorosis	....	42	42
Diphtheria	240	328	478
Dropsy	25	25	50
Erysipelas	52	38	90
Fever, intermittent	22	15	37
" remittent	13	5	18
" scarlet	68	85	153
" pernicious	3	4	7
" typho-malarial	33	17	50
" typhoid	602	456	1,058
" typhus	....	....	.....
" cerebro-spinal	2	....	2
" puerperal	....	15	15
" continued	5	2	7
Gout	4	1	5
Influenza	290	140	430
Leucocythemia	4	3	7
Measles	39	43	82
Mumps	13	20	33
Pyæmia, septicæmia	46	53	99

TABLE III.—*Continued.*

Disease.	Male.	Female.	Total.
Zymotic and General.—Continued.			
Purpura	....	2	2
Rheumatism, acute	187	148	335
" chronic	86	55	141
" gonorrhœal	27	9	36
Small pox	....	....	....
Scrofula	14	10	24
Syphilis, primary	51	55	106
" secondary	49	48	97
" tertiary	26	16	42
" hereditary	6	11	17
Vaccination	3	3	6
Whooping-cough	7	13	20
Miscellaneous, not otherwise classified.			
Abscess, general	208	138	346
" psoas	17	12	29
" of breast	1	39	40
Alcoholism	255	31	286
Amputations	136	53	189
Cancer, epithelial	73	74	147
Miscellaneous, not otherwise classified.—Continued.			
Encephaloid	26	20	46
" schirrus	15	43	58
" melanotic	....	....	3
Contusions	112	45	157
Cellulitis	38	33	71
Coxalgia	35	28	63
Debility	97	167	264
Goitre	9	15	24
Gangrene	24	18	42
Gunshot wounds	28	7	35
Hernia	152	160	212
Injuries not otherwise classed	743	507	1,250
Sprains	67	23	90
Tumors, fibriod	16	88	104
" fatty	10	27	37
" cartilaginous	9	9	18
" cystic	29	63	92
" other	49	40	89
Tetanus	3	1	4
Talipes	29	4	33
Ulcers	150	130	280

TABLE IV.—Shewing the collective stay in days of the adult and infant patients; also, the average length of time each patient was under treatment.

Name of Hospitals.	Location.	Number of patients, including infants born.	Collective stay of infants under one year of age.	Collective stay of adult patients.	Total collective stay of adults and infants.	Average stay of each patient, including the infants.
General Hospital	Toronto	2,976	2,036	90,920	92,956	32
Grace (Homœopathic) Hospital	"	801	1,805	21,243	23,048	28
Hospital for Sick Children	"	562		31,782	31,782	56
St. Michael's Hospital	"	1,415	938	40,875	41,813	29
City Hospital	Hamilton	1,042	768	25,630	26,398	25
St. Joseph's Hospital	"	408		10,388	10,388	25
General Hospital	Kingston	1,328	219	22,803	23,022	18
Hotel Dieu Hospital	"	880		22,119	22,119	25
General Protestant Hospital	Ottawa	729		19,575	19,575	26
Roman Catholic Hospital	"	1,004		25,658	25,658	25
House of Mercy Lying-in Hospital	"	385	540	11,914	12,454	35
General Hospital	London	842	588	19,128	19,716	23
St. Joseph's Hospital	"	365	719	8,408	9,127	25
General and Marine Hospital	St. Catharines	349	343	7,913	8,256	23
Galt Hospital	Galt	288	180	6,337	6,517	22
General Hospital	Guelph	538	435	15,283	15,718	29
St. Joseph's Hospital	"	300	10	7,936	7,946	26
General Hospital	Pembroke	292		8,284	8,284	28
General Hospital	Mattawa	271		4,802	4,802	18

J. H. Stratford Hospital	Brantford	282	154	6,239	6,393	22
St. Joseph's Hospital	Port Arthur	120		3,853	3,853	32
Belleville Hospital	Belleville	265	164	5,070	5,234	19
St. Vincent de Paul Hospital	Brockville	359	10	8,988	8,998	25
General Hospital	"	428	125	10,344	10,469	24
General and Marine Hospital	Collingwood	64	31	1,958	1,989	31
Nichol's Hospital	Peterborough	269	41	7,566	7,607	28
St. Joseph's Hospital	"	221		5,559	5,559	25
Hotel Dieu Hospital	Windsor	247	35	5,738	5,773	23
St. Joseph's Hospital	Chatham	279	48	5,488	5,536	19
General Hospital	Stratford	205	269	7,200	7,469	36
Amasa Wood Hospital	St. Thomas	140	152	2,758	2,910	20
General and Marine Hospital	Owen Sound	102	29	2,623	2,652	26
Sick Children's Hospital	Ottawa	73	3,424	1,686	5,110	58
General Hospital	Chatham	232	155	4,428	4,583	19
General Hospital	Sudbury	106	11	2,445	2,456	23
General Hospital	Huntsville	107	54	1,450	1,504	14
Woodstock Hospital	Woodstock	130	10	2,693	2,703	21
Berlin and Waterloo Hospital	Berlin	115	19	2,923	2,942	25
Maternity Hospital	Ottawa	117	702	949	1,651	14
Huntsville Hospital	Huntsville	360	21	5,652	5,673	16
General Hospital	Sarnia	175	149	4,372	4,521	26
Western Hospital	Toronto	255	1	5,282	5,283	20
St. Joseph's Hospital	Sudbury	191		2,800	2,800	15
Total for 1897		19,617	14,185	509,062	523,247	27
Total for 1896		17,517	7,457	489,146	496,603	28

TABLE V.—Shewing the deductions which have to be made from the collective stay of the patients for the protracted residence of incurable and lying-in cases, etc. For persons coming within these classes only seven cents per day is allowed.

Names of Hospitals.	Location.	Collective days' stay, exclusive of infants under one year of age.	Deduct for incurables and lying-in-cases, for which only Refuge rate is to be allowed, also deduct the days' stay of patients who paid $3 and over per week, also infants under one year	Number of days' stay for which Hospital allowance is to be made.
General Hospital	Toronto	90,920	14,973	75,947
Grace (Homœopathic) Hospital	"	21,243	1,098	20,145
Hospital for Sick Children	"	31,785	365	31,420
St. Michael's Hospital	"	40,875	1,922	38,953
City Hospital	Hamilton	25,630	2,934	22,696
St. Joseph's Hospital	"	10,388	265	10,123
General Hospital	Kingston	22,803	7,768	15,035
Hotel Dieu Hospital	"	22,119	2,267	19,852
General Protestant Hospital	Ottawa	19,575	5,558	14,017
Roman Catholic Hospital	"	25,658	5,738	19,920
House of Mercy Lying-in Hospital	"	11,914	6,310	5,604
General Hospital	London	19,128	8,060	11,068
St. Joseph's Hospital	"	9,127	719	8,408
General and Marine Hospital	St. Catharines	8,045	2,694	5,351
Galt Hospital	Galt	6,337	721	5,616
General Hospital	Guelph	15,283	3,186	12,097
St. Joseph's Hospital	"	7,936	1,253	6,683
General Hospital	Pembroke	8,284	1,161	7,123
General Hospital	Mattawa	4,802	528	4,274

J. H. Stratford Hospital	Brantford	6,239	855	5,384
St. Joseph's Hospital	Port Arthur	3,853	648	3,205
Belleville Hospital	Belleville	5,070	1,176	3,894
St. Vincent de Paul Hospital	Brockville	8,988	126	8,862
General Hospital	"	10,344	1,611	8,733
General and Marine Hospital	Collingwood	1,958	80	1,878
Nichol's Hospital	Peterborough	7,566	538	7,028
St. Joseph's Hospital	"	5,559	415	5,144
Hotel Dieu Hospital	Windsor	5,738	81	5,757
St. Joseph's Hospital	Chatham	5,488	354	5,134
General Hospital	Stratford	7,200	1,577	5,623
Amasa Wood Hospital	St. Thomas	2,758	478	2,280
General and Marine Hospital	Owen Sound	2,623	198	2,425
Sick Children's Hospital	Ottawa	5,110	1,906	3,204
General Hospital	Chatham	4,428	144	4,284
General Hospital	Sudbury	2,445	80	2,365
General Hospital	Huntsville	1,450	.....	1,450
Woodstock Hospital	Woodstock	2,693	102	2,591
Berlin and Waterloo Hospital	Berlin	2,923	58	2,865
Maternity Hospital	Ottawa	1,651	101	1,550
Huntsville Hospital	Huntsville	5,652	203	5,449
General Hospital	Sarnia	4,372	95	4,277
Western Hospital	Toronto	5,282	296	4,986
St. Joseph's Hospital	Sudbury	2,800	.. ..	2,800
Total, 1897		514,142	78,642	435,500
Total, 1896		492,329	73,931	418,398

TABLE VI.—Relative to income of Hospitals.

Names of Hospitals.	Location.	Amounts received from municipalities as a grant and for patients' maintenance.	Amount received from patients for board.	Amount received as income from property or investments belonging to Hospitals.	Subscriptions and donations of private individuals and incidental receipts.	Total receipts from all sources other than the Government grant.	One fourth of such receipts.	Amount of the 10 cents per day additional grant.
		$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
General Hospital	Toronto	20,216 95	19,701 83	11,467 32	4,185 10	55,571 20	13,892 80	7,594 70
Grace (Homœopathic) Hospital	"	5,057 20	6,445 42	427 50	2,753 94	14,684 06	3,671 01	2,014 50
Hospital for Sick Children	"	7,500 00	1,325 20		54,899 76	63,884 96	15,971 24	3,142 00
St. Michael's Hospital	"	8,240 00	4,929 88		5,475 59	18,645 47	4,661 36	3,895 30
City Hospital	Hamilton	19,324 42	2,222 37			21,546 79	5,386 69	2,269 60
St. Joseph's Hospital	"		2,951 86	640 00	1,549 76	5,141 62	1,285 40	1,012 30
General Hospital	Kingston	2,325 80	4,426 13	307 30	2,946 42	9,985 65	2,496 41	1,503 50
Hotel Dieu Hospital	"	600 00	1,822 10	471 00	6,406 45	9,299 55	2,324 88	1,985 20
General Protestant Hospital	Ottawa	3,173 52	1,804 44		9,400 48	14,378 44	3,594 61	1,401 70
Roman Catholic Hospital	"	1,450 00	2,919 56	149 00	2,256 57	6,775 13	1,443 28	1,443 28
House of Mercy Lying-in Hospital	"	50 00	1,029 10		5,892 18	6,971 28	1,742 82	560 40
General Hospital	London	8,544 70	4,069 15	402 64		13,016 49	3,254 12	1,106 80
St. Joseph's Hospital	"		6,020 83		1,037 36	7,058 19	1,766 54	840 80
General and Marine Hospital	St. Catharines.	1,900 00	2,555 93	21 14	6,288 81	10,765 88	2,691 47	535 10
Galt Hospital	Galt	2,000 00	2,433 57		950 90	5,384 47	1,346 12	561 60
General Hospital	Guelph	2,175 00	3,688 45		1,151 78	7,015 23	1,753 80	1,209 70
St. Joseph's Hospital	"	612 00	1,894 33		3,198 14	5,704 47	1,426 12	668 30
General Hospital	Pembroke	200 00	1,245 37		1,215 93	2,661 30	665 32	665 32
General Hospital	Mattawa		483 14		1,952 32	2,435 46	608 86	427 40

J. H. Stratford Hospital	Brantford	2,500 00	1,096 87		1,543 25	5,140 12	1,285 03	538 40
St. Joseph's Hospital	Port Arthur	550 00	371 00			921 00	230 25	230 25
Belleville Hospital	Belleville	520 25	1,710 34		748 60	2,979 19	744 79	389 40
St. Vincent Du Paul Hospital	Brockville	400 00	1,388 30		2,616 47	4,404 77	1,101 14	886 20
General Hospital	"	600 00	4,063 54	258 68	1,692 54	6,614 76	1,653 69	873 30
General and Marine Hospital	Collingwood	280 00	624 28		414 28	1,318 56	563 40	187 80
Nichol's Hospital	Peterborough		1,221 77	4,072 00		5,293 77	1,323 44	702 80
St. Joseph's Hospital	"	162 60	678 70		1,434 00	2,275 30	568 82	514 10
The Hotel Dieu Hospital	Windsor	351 77	1,700 00		2,137 52	4,189 29	1,047 32	575 70
St. Joseph's Hospital	Chatham	80 39	2,334 00		300 00	2,714 39	678 59	513 40
General Hospital	Stratford	1,600 00	2,087 47	70 65	2,208 07	5,966 19	1,491 54	562 30
Amasa Wood Hospital	St. Thomas	1,500 00	1,201 85	40 00	50 00	2,791 85	697 96	229 00
General and Marine Hospital	Owen Sound	955 42	528 90		701 98	2,186 30	546 57	242 50
Sick Children's Hospital	Ottawa	50 00	2,267 80		1,860 83	4,178 63	1,044 66	320 40
General Hospital	Chatham	192 50	2,078 90		468 43	2,739 83	684 96	428 40
General Hospital	Sudbury		1,321 85		761 04	2,082 89	520 71	236 30
General Hospital	Huntsville		133 68		680 15	813 83	203 46	145 00
Wookstock Hospital	Woodstock	600 00	2,475 23		307 85	3,383 08	845 77	259 10
Berlin and Waterloo Hospital	Berlin	2,250 00	928 82		2,248 69	5,427 51	1,356 88	286 50
Maternity Hospital	Ottawa	50 00	610 66		746 04	1,406 70	1,406 70	351 67
Huntsville Hospital	Huntsville		1,589 29		4,022 06	5,611 35	1,402 84	546 90
General Hospital	Sarnia	250 00	2,538 34			2,788 34	697 08	427 70
Western Hospital	Toronto	778 94	3,121 83		491 91	4,392 68	1,098 17	498 60
St. Joseph's Hospital	Sudbury		198 15		1,879 35	2,077 50	519 34	280 00
Total for 1897		97,041 46	108,240 23	18,327 23	138,874 55	362,623 47	91,695 00	43,063 20
Total for 1896		90,508 58	100,823 89	6,910 57	113,484 26	311,727 30	77,431 70	41,839 80

TABLE VII.—Showing the basis upon which statutory aid is granted.

Names of Hospitals.	Location	Collective days' stay upon which computation of Hospital rates is based.	Collective days' stay upon which computation of Refuge rates is based.	Computation at 20 cents per day.	Supplementary allowance of one-fourth of amount received from all sources other than Government.	Supplementary computation at 10 cents per day.	Computation at 7 cents per day, being refuge rate for improper cases for Hospital treatment.	Total computation of maximum rates under Charity aid Act.	Amount payable to each hospital from appropriation by the Legislature, for 1897.
				$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
General Hospital	Toronto	75,947	6,977	15,189 40		7,594 70	488 39	23,272 49	19,186 46
Grace Homœopathic Hospital	"	20,145	1,098	4,029 00		2,014 50	76 86	6,120 36	5,045 79
Hospital for Sick Children	"	31,420		6,284 00		3,142 00		9,426 00	7,771 04
St. Michael's Hospital	"	38,953	1,922	7,790 60		3,895 30	134 54	11,820 44	9,745 09
City Hospital	Hamilton	22,696	2,702	4,539 20		2,269 60	189 14	6,997 94	5,769 29
St. Joseph's Hospital	"	10,123	265	2,024 60		1,012 30	18 55	3,055 45	2,518 99
General Hospital	Kingston	15,035	4,252	3,007 00		1,503 50	297 64	4,808 14	3,963 96
Hotel Dieu Hospital	"	19,852	1,847	3,970 40		1,985 20	119 29	6,074 89	5,008 30
General Protestant Hospital	Ottawa	14,017	4,439	2,803 40		1,401 70	310 73	4,515 83	3,722 97
Roman Catholic Hospital	"	19,920	3,481	3,984 00	1,443 28		243 67	5,670 95	4,675 28
House of Mercy Lying-in Hospital	"	5,604	5,460	1,120 80		560 40	382 20	2,063 40	1,701 12
General Hospital	London	11,068	5,192	2,213 60		1,106 80	363 44	3,683 84	3,037 06
St. Joseph's Hospital	"	8,408	719	1,681 60		840 80	50 33	2,572 73	2,121 03
General and Marine Hospital	St. Catharines	5,351	637	1,070 20		535 10	44 59	1,649 89	1,360 21
Galt Hospital	Galt	5,616	721	1,123 20		561 60	50 47	1,735 27	1,430 60
General Hospital	Guelph	12,097	975	2,419 40		1,209 70	68 25	3,697 35	3,048 19
St. Joseph's Hospital	"	6,683	157	1,336 60		668 30	10 99	2,015 89	1,661 95
General Hospital	Pembroke	7,123	291	1,424 60	665 32		20 37	2,110 29	1,739 78
General Hospital	Mattawa	4,274	490	854 80		427 40	34 30	1,316 50	1,085 36

J. H. Stratford Hospital	Brantford	5,384	521	1,076 80		538 40	36 47	1,651 67	1,361 68
St. Joseph's Hospital	Port Arthur	3,205		641 00	230 25			871 25	718 28
Belleville Hospital	Belleville	3,894	555	778 80		389 40	38 85	1,207 05	995 12
St. Vincent Du Paul Hospital	Brockville	8,862	126	1,772 40		886 20	8 82	2,667 42	2,199 09
General Hospital	"	8,733	1,611	1,746 60		873 30	112 77	2,732 67	2,252 89
General and Marine Hospital	Collingwood	1,878	120	375 60		187 80	8 40	571 80	471 41
Nichol's Hospital	Peterborough	7,028	538	1,405 60		702 80	37 86	2,146 26	1,769 43
St. Joseph's Hospital	"	5,144	415	1,028 20		514 10	29 05	1,571 35	1,295 46
The Hotel Dieu Hospital	Windsor	5,757	81	1,151,40		575 70	5 47	1,732 57	1,428 38
St. Joseph's Hospital	Chatham	5,134	354	1,026 80		513 40	24 78	1,564 98	1,290 21
General Hospital	Stratford	5,623	1,577	1,124 60		562 30	110 39	1,797 29	1,481 73
Amasa Wood Hospital	St. Thomas	2,280	478	458 00		229 00	33 00	720 00	593 59
General and Marine Hospital	Owen Sound	2,425	198	485 00		242 50	13 86	741 36	611 20
Sick Children's Hospital	Ottawa	3,204	220	640 80		320 40	15 40	976 60	805 14
General Hospital	Chatham	4,284	144	856 80		428 40	10 08	1,295 28	1,067 86
General Hospital	Sudbury	2,365	82	472 60		236 30	5 74	714 64	589 17
General Hospital	Huntsville	1,450		290 00		145 00		435 00	358 63
Woodstock Hospital	Woodstock	2,591	102	518 20		259 10	7 14	784 44	646 71
Berlin and Waterloo Hospital	Berlin	2,865	58	573 00		286 50	4 05	863 55	711 93
Maternity Hospital	Ottawa	1,550	101	310 00		155 00	7 07	472 07	389 19
Huntsville Hospital	Huntsville	5,449	203	1,093 80		546 90	14 21	1,654 91	1,364 35
General Hospital	Sarnia	4,277	95	855 40		427 70	6 65	1,289 75	1,063 30
Western Hospital	Toronto	4,986	296	997 20		498 60	20 72	1,516 52	1,250 26
St. Joseph's Hospital	Sudbury	2,800		560 00		280 00		840 00	692 52
Total, 1897		435,500	49,500	87,105 00	2,338 85	40,527 70	3,454 53	133,426 08	110,000 00
Total, 1896		418,398	42,852	83,679 60	926 64	40,808 30	2,999 64	128,414 18	110,000 00

TABLE VIII.—Shewing the cost of maintaining the Hospitals; also the average daily cost per patient, etc.

Names of Hospitals.	Location.	Collective days' stay, exclusive of infants under one year of age.	Cost of dietaries.	Salaries, fuel, light, medicines, bedding, and all other expenditures of maintenance account.	Total expenditure for maintenance.	Average cost of each patient per day.
			$ c.	$ c.	$ c.	cents.
General Hospital	Toronto	90,920	24,536 05	44,988 80	69,524 85	76.47
Grace (Homœopathic) Hospital	"	21,243	8,916 78	12,227 33	21,144 11	99.53
Hospital for Sick Children	"	31,785	6,752 73	32,253 14	39,005 87	$1 22.08
St. Michael's Hospital	"	40,875	8,851 38	11,887 55	20,738 93	80.91
City Hospital	Hamilton	25,630	7,210 77	16,656 00	23,866 77	93.12
St. Joseph's Hospital	"	10,388	2,658 08	5,174 19	7,832 27	75.38
General Hospital	Kingston	22,803	5,394 25	10,059 62	15,453 87	67.77
Hotel Dieu Hospital	"	22,119	7,169 66	7,220 03	14,389 69	65.05
General Protestant Hospital	Ottawa	19,575	3,321 89	11,611 03	14,932 92	76.28
Roman Catholic Hospital	"	25,658	5,138 20	4,222 88	9,361 08	78.56
House of Mercy Lying-in Hospital	"	11,914	2,723 42	3,596 26	6,319 68	53 04
General Hospital	London	19,128	4,476 65	12,296 07	16,772 72	87.68
St. Joseph's Hospital	"	9,127	2,741 34	5,974 72	8,716 06	95.49
General and Marine Hospital	St. Catharines	8,045	3,000 12	5,567 99	8,568 11	$1 06 37
Galt Hospital	Galt	6,337	1,302 48	4,354 58	5,657 06	89.27
General Hospital	Guelph	15,283	2,691 67	6,795 57	9,487 24	62.07
St. Joseph's Hospital	"	7,936	3,357 69	4,940 47	8,298 16	$1 04.56
General Hospital	Pembroke	8,284	1,661 64	2,609 91	4,271 55	51 56
General Hospital	Mattawa	4,802	1,743 40	1,795 90	3,539 30	73.70

J. H. Stratford Hospital	Brantford	6,239	1,416 03	5,274 01	6,690 04	$1 07.22
St. Joseph's Hospital	Port Arthur	3,853	689 75	1,220 55	1,910 30	49.57
Belleville Hospital	Belleville	5,070	1,473 84	3,321 20	4,795 04	94.57
St. Vincent de Paul Hospital	Brockville	8,988	1,876 43	3,781 89	5,658 32	62.95
General Hospital	"	10,344	2,200 15	5,740 07	7,940 22	76.76
General and Marine Hospital	Collingwood	1,938	395 34	1,668 91	2,064 25	$1 06.51
Nichol's Hospital	Peterborough	7,566	1,946 25	6,937 12	8,883 37	$1 17.41
St. Joseph's Hospital	"	5,559	614 68	3,183 90	3,798 58	68.27
The Hotel Dieu Hospital	Windsor	5,738	1,214 09	1,501 65	2,715 74	47.32
St. Joseph's Hospital	Chatham	5,134	1,520 02	2,660 27	4,180 29	81.42
General Hospital	Stratford	5,623	1,545 87	4,465 48	6,011 35	$1 06.90
Amasa Wood Hospital	St. Thomas	2,290	1,221 74	2,634 46	3,856 20	$1 68.39
General and Marine Hospital	Owen Sound	2,425	589 48	1,738 27	2,327 75	95.99
Sick Children's Hospital	Ottawa	3,204	1,360 89	3,531 45	4,892 34	$1 52.69
General Hospital	Chatham	4,284	991 00	1,951 29	2,942 29	68.68
General Hospital	Sudbury	2,363	1,170 37	2,092 04	3,262 41	$1 38.06
General Hospital	Huntsville	1,450	381 00	778 00	1,159 00	79.86
Woodstock Hospital	Woodstock	2,591	942 04	2,641 80	3,583 84	$1 38.31
Berlin and Waterloo Hospital	Berlin	2,865	866 19	2,753 33	3,619 52	$1 26.33
Maternity Hospital	Ottawa	1,550	383 91	1,214 65	1,598 56	$1 03.12
Huntsville Hospital	Huntsville	5,449	1,632 80	5,016 41	6,649 21	$1 22.02
General Hospital	Sarnia	4,277	1,355 20	3,549 56	4,904 76	$1 14.67
Western Hospital	Toronto	4,986	1,537 14	2,711 51	4,248 65	85.21
St. Joseph's Hospital	Sudbury	2,800	712 35	2,022 42	2,734 77	97.67
Total 1897		508,448	131,674 76	276,632 28	408,307 04	80.30
Total 1896		492,329	119,221 39	235,592 23	354,013 62	71.90

TABLE IX.—Shewing the comparative cost per patient daily in the different Hospitals for a period of years.

Hospitals.	Location.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
		Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
General Hospital	Toronto	85.71	77.71	73.24	84.35	85.00	78.98	81.07	85.15	91.03	85.50	75.49	75.39	76.47
Grace (Homœopathic) Hospital	"						99.70	71.85	94.34	61.70	85.67	84.92	72.98	99.53
Hospital for Sick Children	"							79.82	1.39.21	61.37	76.24	74.91	67.24	1.22.08
St. Michael's Hospital	"									63.21	66.53	51.53	44.23	80.91
City Hospital	Hamilton	59.22	62.70	66.00	68.55	66.13	74.24	94.27	93.06	1.16.39	90.94	89.61	91.21	93.12
St. Joseph's Hospital	"							67.33	43.70	54.42	61.79	72.75	80.02	75.38
General Hospital	Kingston	53.00	48.09	56.42	64 06	58.79	53.66	62.03	59.37	90.92	85.74	75.58	60 39	67.77
Hotel Dieu Hospital	"	45.54	54.85	44.10	49.98	44 55	48.83	50.63	46.34	66.53	63.58	52.20	67.06	65.05
General Protestant Hospital	Ottawa	47.80	49.67	62.00	53.11	59.34	73.02	58.50	71.45	1.02.58	65.10	74.22	66.73	76.28
Roman Catholic Hospital	"	52.94	41.09	46.12	49.40	56.79	46.60	68.57	64 81	71.05	58.34	48.94	60.81	78.56
House of Mercy Lying-in-Hospital	"	47.17	39.58	32.81	28.84	49.29	50.48	47.82	42.79	1.31.45	60.46	49 95	82 67	53.04
General Hospital	London	62.72	67.83	73.96	59.51	94.95	88.29	88.51	94.54	1.09.14	91.68	83.32	83.29	87 68
St. Joseph's Hospital	"							38.69	25.87	59.39	48.40	57.88	48.82	95.49
General and Marine Hospital	St. Catharines	81.85	60.07	63.43	69.38	67.12	81.06	79.32	68.70	78.72	58.89	65.85	74.29	1.06 37
Galt Hospital	Galt							2 07.74	1.06.83	96.10	95.61	88.10	1.01.14	89.27
General Hospital	Guelph	64.41	90.87	66.10	63 04	68.41	77.69	73.92	82.55	94.60	84.93	82.68	66.99	62.07
St. Joseph's Hospital	"	57.05	49.02	52.34	48 52	41.66	43.57	55.35	47.43	64.36	42.72	32.28	43.84	1.04.56
General Hospital	Pembroke	65.63	77.69	67.75	85.57	58.46	67.00	60.98	62.37	81.56	65.67	61.63	52.47	51.56
General Haspital	Mattawa	68.88	94.39	56.98	72.81	64.10	77.90	69.20	53.42	78.65	54.82	54 51	67.38	73.70
J. H. Stratford Hospital	Brantford	1.23.00	71.51	58.17	68.25	52.38	59.78	70.37	62 15	71.33	77.58	77.06	85 43	1.07.22

St. Joseph's Hospital	Port Arthur	47.06	55.12	64.17	47.80	49.53	60.00	45.61	54.80	54.90	87.33	1.20.71	59.57	49.57
Belleville Hospital	Belleville			44.12	74.96	1.05.00	85.70	79.82	75.81	1.09.54	97.54	92.70	85.11	94.57
St. Vincent De Paul Hospital	Brockville					34.29	28.23	50.77	49.98	55.82	52.33	53.50	93.76	62.95
General Hospital	"					1.32.00	97.46	66.65	69.56	1.02.38	82.82	1.21.66	70.68	76.76
General and Marine Hospital	Collingwood						1.01.00	1.24.29	86.11	86.38	60.96	71.02	1.22 91	1.06.51
Nichols' Hospital	Peterborough						2.11.00	1.34.22	1.35.10	1.52.55	76.00	88.65	81.57	1.17.41
St. Joseph's Hospital	"							69 71	1.08.69	89.07	83.46	74.07	62.34	68.27
The Hotel Dieu Hospital	Windsor							1.65.37	98.40	47.79	51.15	37.85	46 00	47.32
St. Joseph's Hospital	Chatham								48.56	75.44	71.05	76.17	67.18	81.42
General Hospital	Stratford								92.40	86.96	75.72	80 38	79.78	1 06.90
Amasa Wood Hospital	St. Thomas									1.41.24	1.06.28	1.23.65	1.17.43	1 68.39
General and Marine Hospital	Owen Sound									5.09.10	93.28	1.00.90	69.04	95.99
Sick Children's Hospital	Ottawa										1.55.96	76 53	96 40	1.52.69
General Hospital	Chatham										52.73	56.20	47.59	68.68
General Hospital	Sudbury											1.36.41	1.10.37	1.38.06
General Hospital	Huntsville												72.18	79 86
Woodstock Hospital	Woodstock												1 26.82	1.38.31
Berlin and Waterloo Hospital	Berlin												1.52.26	1.26.33
Maternity Hospital	Ottawa												1.52.21	1 03.12
Huntsville Hospital	Huntsville													1.22.02
General Hospital	Sarnia													1.14.67
Western Hospital	Toronto													85.21
St. Joseph's Hospital	Sudbury													97.67
Total, 1897														80.30
Total, 1896														71.90

TABLE X.—Shewing proportion of maintenance of Hospitals paid by Government.

Name of Hospitals.	Location.	Revenue on maintenance account exclusive of government grant.	Government grant in aid of maintenance.	Total revenue for maintenance.	Total expenditure for maintenance.	Percentage of government grant to total expenditure for maintenance.
		$ c.	$ c.	$ c.	$ c.	
General Hospital	Toronto	55,571 20	19,638 61	75,209 81	69,524 85	.29
Grace (Homœopathic) Hospital	"	14,684 06	4,764 62	19,448 68	21,144 11	.41
Hospital for Sick Children	"	63,884 96	8,258 34	72,143 30	39,005 87	.21
St. Michael's Hospital	"	18,645 47	8,001 57	26,647 04	20,738 93	.38
City Hospital	Hamilton	21,546 79	5,871 74	27,418 53	23,866 77	.24
St. Joseph's Hospital	"	5,141 62	2,745 15	7,886 77	7,832 27	.35
General Hospital	Kingston	9,985 65	4,174 73	14,160 38	15,453 87	.27
Hotel Dieu Hospital	"	9,299 55	5,144 22	14,443 77	14,389 69	.35
General Pretestant Hospital	Ottawa	14,378 44	4,538 23	18,916 67	14,932 92	.30
Roman Catholic Hospital	"	6,775 13	4,422 28	11,197 41	9,361 08	.47
House of Mercy Lying-in Hospital	"	6,971 28	1,587 59	8,558 87	6,319 68	.25
General Hospital	London	13,016 49	3,756 23	16,772 72	16,772 72	.22
St. Joseph's Hospital	"	7,058 19	2,197 90	9,256 09	8,716 06	.25
General and Marine Hospital	St. Catharines	10,765 88	1,834 22	12,600 10	8,568 11	.21
Galt Hospital	Galt	5,384 47	1,203 80	6,588 27	5,657 06	.21
General Hospital	Guelph	7,015 23	3,279 51	10,294 74	9,487 24	.34
St. Joseph's Hospital	"	5,704 47	2,593 69	8,298 16	8,298 16	.31
General Hospital	Pembroke	2,661 30	1,788 08	4,449 38	4,271 55	.41
General Hospital	Mattawa	2,435 46	1,493 56	3,929 02	3,539 30	.42
J. H. Stratford Hospital	Brantford	5,140 12	1,923 01	7,063 13	6,690 04	.28

St. Joseph's Hospital	Port Arthur	921 00	796 66	1,717 66	1,910 30	.41
Belleville Hospital	Belleville	2,979 19	1,252 81	4,232 00	4,795 04	.26
St. Vincent De Paul Hospital	Brockville	4,404 77	1,436 16	5,840 93	5,658 32	.25
General Hospital	"	6,614 76	2,119 48	8,734 24	7,940 22	.26
General and Marine Hospital	Collingwood	1,318 56	559 70	1,878 26	2,064 25	.27
Nichol's Hospital	Peterborough	5,293 77	2,335 77	7,629 54	8,883 37	.26
St. Joseph's Hospital	"	2,275 30	846 00	3,121 30	3,798 58	.22
The Hotel Dieu Hospital	Windsor	4,189 29	1,708 82	5,898 11	2,715 74	.62
St. Joseph's Hospital	Chatham	2,714 39	1,243 15	3,957 54	4,180 29	.29
General Hospital	Stratford	5,966 19	1,644 79	7,610 98	6,011 35	.27
Amasa Wood Hospital	St. Thomas	2,791 85	661 91	3,453 76	3,856 20	.17
General and Marine Hospital	Owen Sound	2,186 30	767 75	2,954 05	2,327 75	.33
Sick Children's Hospital	Ottawa	4,178 63	723 99	4,902 62	4,892 34	.14
General Hospital	Chatham	2,739 83	1,363 58	4,103 41	2,942 29	.46
General Hospital	Sudbury	2,082 89	1,044 01	3,126 90	3,262 41	.32
General Hospital	Huntsville	813 83	344 17	1,158 00	1,159 00	.29
Woodstock Hospital	Woodstock	3,383 08	734 45	4,117 53	3,583 84	.20
Berlin and Waterloo Hospital	Berlin	5,427 51	979 59	6,407 10	3,619 52	.27
Maternity Hospital	Ottawa	1,406 70	220 13	1,626 83	1,598 56	.13
Huntsville Hospital	Huntsville	5,611 35		5,611 35	6,649 21	.24
General Hospital	Sarnia	2,788 34		2,788 34	4,904 76	.26
Western Hospital	Toronto	4,392 68		4,392 68	4,248 65	.35
St. Joseph's Hospital	Sudbury	2,077 50		2,077 50	2,734 77	.30
Total 1897		362,623 47	110,000 00		408,307 04	29.39
Total 1896		311,727 30	110,082 49	421,809 79	354,013 60	31.07

SEPARATE REPORTS AND INSPECTIONS.

GENERAL HOSPITAL, TORONTO.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment in all departments of the Hospital 1st October, 1896	255	
Admitted	2,584	
Births in the Hospital	137	
Total number under treatment		2,976
Discharges, including infants	2,536	
Died	180	
Under treatment, 30th September, 1897	260	
		2,976

Of the 2,976 persons treated during the year, 190 males and 104 females were inmates of the Andrew Mercer Eye and Ear Infirmary, and 299 in the Burnside Lying-in branch. The latter number includes 79 male and 58 female children born in the Institution.

Places Received From.

From the City of Toronto (including 137 infants born)	2,116	
From the County of York	144	
From other Counties in the Province	698	
From United States	16	
From other countries, including immigrants	2	
		2,976

Sex.

Male	1,592	
Female	1,384	
		2,976

Nationalities.

Canada	1,775	
English	650	
Irish	256	
Scotch	145	
United States	88	
Other countries	62	
		2,976

The following table gives a summary of certain diseases treated in the Toronto General Hospital during the year:

	No. of cases treated.
Typhoid Fever	116
Typhus "	....
Puerperal "	....
Cerebro Spinal Fever	....
Diphtheria	2
Smallpox	....

Religious Denominations.

Protestant	2,699	
Roman Catholic	247	
Other religions, or not known	30	
	——	2,976

Revenue.

From the Province of Ontario	$19,638 61
From the City of Toronto in payment of patients' maintenance	18,973 20
From the County of York, in payment of patients' maintenance	686 20
From other municipalities of the Province	557 55
From paying patients themselves	19,701 83
Income from property belonging to Hospital Trust	11,467 32
Subscriptions, donations and bequests of private individuals	1,267 37
From all other sources not above enumerated	2,917 71
Total	$75,209 81

Expenditures.

Butchers' meat, poultry and fish	$9,160 21
Butter	2,497 88
Eggs	1,312 64
Flour, bread and meal	2,336 18
Milk	3,373 17
Tea and coffee	1,412 95
Potatoes and other vegetables	1,982 32
Groceries and provisions, not enumerated	2,460 70
Drugs and medicines	3,804 29
Medical and surgical appliances, bandages, etc	3,194 00
Surgical instruments, ordinary	620 79
Beer, wine and spirits	523 97
Bedding, napery and general house furnishing	3,117 17
Brooms, brushes, mops, soap and cleansing appliances	674 81
Fuel	6,034 71
Light—gas, oil and candles	1,631 21
Water supply	468 00

Hay and straw	$34 10
Clothing for employees and patients, including boots and shoes	.....
Nurses' uniforms, badges, etc.	767 35
Ice supply	391 37
Salaries and wages	18,552 95
Insurance	824 01
Coffins and funerals	.....
Advertising and printing	42 15
Contingencies	57 34
Repairs, ordinary	3,913 45
Telephone and elevator service	337 08
Legal costs	.....
Total	$69,524 85
Government Grant for 1897	$19,186 46

INSPECTIONS.

I made an inspection of the General Hospital, Toronto, on the 7th June, and found therein a total population of 247 patients, distributed as follows :—

In the general wards, 106 males and 89 females; eye and ear infirmary, 18 males and 5 females; lying-in branch, 13 females, and in the pavilion 16 females.

The number of patients treated since the 1st October was 1,780; and the deaths 122.

The buildings and grounds were in good order, several improvements having been made during the spring. The public wards and private rooms, beds and bedding, linen rooms, ward kitchens, operating rooms, instrument room, sitting rooms, dining rooms, kitchen, laundry, furnace room, cellar, wash rooms, bath rooms and water closets were all in a well kept condition of cleanliness and order.

I inspected this Hospital again on the 4th December. There were 269 patients in residence on that day. Since the 1st October there were 459 admissions and 27 deaths.

The Burnside lying-in department, which contained ten women and five infants, was clean and in good order. There have been 565 consecutive births without the death of a mother.

The pavilion, specially for the treatment of diseases of women, was found to be in good order. Improvements have been made in this department during the year; there is a good operating room and conveniences. There were 19 patients here on this occasion.

In the eye and ear department, there were 29 patients—20 males and 9 females. The patients are from all parts of the Province.

In the main building I found the surgical and medical wards clean and in well kept order, also the kitchen, laundry, supply department, engineer's department, offices, reception rooms, private rooms, dispensary, operating rooms, instrument and anæsthetic room, bath-rooms, wash rooms and water closets. The Hospital is well equipped with fire appliances.

The kitchen has been furnished with a new range, steam cooking apparatus and griddlers, at a cost of over $800. In the laundry a new ironing machine and other improvements have been added during the season.

A new sterilizing room has been added to the operating theatre, and the theatre has been much improved since my last visit.

The instrument room has been supplied with an X-Ray apparatus and instruments, costing upwards of $500. A mechanical shop has been arranged to supply splints and other appliances used in the Hospital.

There are good laboratories, including one for the special use of female students attending the Hospital.

The training school for nurses is in a healthy condition ; last year there were over 600 applications to fill 30 vacancies.

Arrangements are being made to introduce electric light into the Hospital.

I was surprised to find so small a number of typhoid cases under treatment at this season of the year.

The Board of Trustees show a great interest in supplying every need of the Institution, and in keeping a close oversight over every department.

Electric lighting will be found quite as economical and much more satisfactory than gaslight, which is now used.

There is a large medical staff in attendance, and a sufficient number of trained nurses and nurses in training to meet the requirements of the Hospital.

The ventilation, heating and drainage are good. The books are well kept, and the management under Dr. O'Rielly appears to be the best that could possibly be given.

GRACE (HOMŒOPATHIC) HOSPITAL, TORONTO.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment in the Hospital, 1st October, 1896	46	
Admitted	672	
Births in the Hospital	83	
Total number under treatment		801
Discharges, including infants	717	
Died	36	
Under treatment, 30th September, 1897	48	
		801

Places Received From.

From City of Toronto	717	
From the County of York	13	
From other counties of the Province	67	
From United States	7	
From other countries, including immigrants	7	
		801

Sex.

Male	262	
Female	539	
		801

Nationalities.

Canadian	426	
English	246	
Irish	47	
Scotch	48	
United States	20	
Other countries	14	
		801

Religious Denominations.

Protestant	744	
Roman Catholic	40	
Other religions, or not known	17	
		801

The following table gives a summary of certain cases treated in the Homœopathic Hospital, Toronto, during the year :

	No. of cases treated.
Typhoid fever	32
Typhus "	..
Puerperal "	1
Cerebro spinal fever	..
Diphtheria	..
Smallpox	..

Revenue.

From the Government of Ontario	$4,764 62
From the City of Toronto in payment of patients' maintenance	5,057 20
From paying patients themselves	6,445 42
Income from endowments or other property of the Hospital	427 50
Subscriptions, donations and bequests of private individuals	2,430 32
From all other sources not above enumerated	321 62
Total	$19,446 68

Expenditures.

Butchers' meat	$3,423 25
Butter	942 76
Eggs	
Flour, bread and meal	858 65
Milk	1,468 39
Tea and coffee	220 32
Potatoes and other vegetables	367 45
Groceries and provisions not enumerated	1,635 96
Drugs and medicines / Medical and surgical appliances	1,469 80
Surgical instruments	14 58
Beer, wine and spirits	108 13
Bedding, napery and general house furnishing	765 69
Brooms, brushes, mops, soap and cleaning appliances	321 77
Fuel	2,545 26
Light—gas, oil and candles	285 80
Water supply	169 95
Hay and straw	6 70
Clothing for patients, including boots and shoes	
Ice	162 76
Salaries and wages	4,364 57
Taxes and Insurance	421 15
Contingencies	684 90
Repairs, ordinary	764 32
Advertising, stationery, etc	141 93

Coffins and funerals	
Rent	
Total	$21,144 09
Government Grant for 1897	$5,045 79

INSPECTIONS.

This Hospital was inspected by me on the 26th April, when I found under treatment 127 patients—72 men, 48 women and 7 infants.

Admitted since the 1st October, 425 ; deaths, 19.

All private rooms and public wards, operating room, dispensary, dining-room, sitting room, bath rooms, water closets, etc., were clean and in good order. The maternity department was in like condition.

There is a good staff of medical men and nurses. The books are properly kept.

I inspected this Hospital on 24th November. There were then 61 patients under treatment—20 males and 41 females. The admissions since the 1st October were 104; and the deaths 2.

The public wards and private rooms, the dispensary, operating room, emergency room, board room, sitting rooms, wash and bath-rooms were all clean and in good order. The building is well lighted, heated and ventilated.

There is a resident medical attendant and good staff of nurses.

Books properly kept.

HOSPITAL FOR SICK CHILDREN, TORONTO.

The following summaries show the operations of this Institution during the year:—

Movements of Inmates.

Under treatment, 1st October, 1896	92	
Admitted	470	
Total number of inmates		562
Discharged	451	
Died	25	
Under treatment, 30th September, 1897	86	
		562

Places Received From.

From the City of Toronto	444	
From the County of York	26	
From other counties of the Province	91	
From United States	....	
From other countries, including immigrants	1	
		562

Sex.

Male	311	
Female	251	
		562

Nationalities.

Canadian	490	
English	49	
Irish	9	
Scotch	6	
United States	1	
Other countries	7	
		562

Religious Denominations.

Protestant	492	
Roman Catholic	62	
Other religions	8	
		562

The following table gives a summary of certain diseases treated in the Sick Children's Hospital during the year:

	No. of cases treated.
Typhoid fever	32
Typhus fever	..
Puerperal fever	..

Cerebro spinal fever	..
Diphtheria	1
Smallpox	..

Revenue.

From the Government of Ontario	$8,258 34
From the Dominion Government	.....
From the County of York	.....
From other municipalities	.....
From the City of Toronto	7,500 00
From patients themselves for maintenance and treatment	1,325 20
From property belonging to the Hospital	.....
From subscriptions, donations and bequests from private individuals	54,737 76
From all other sources not enumerated	162 00
Total	$71,983 30

Expenditures.

Butchers' meat	$1,941 13
Butter	695 86
Eggs	.....
Flour, bread and meal	736 70
Milk	1,122 90
Tea and coffee	182 59
Potatoes and other vegetables	308 63
Groceries and provisions not enumerated	1,764 92
Drugs and medicines	1,059 20
Medical and surgical appliances	803 55
Surgical instruments	411 64
Beer, wine and spirits	36 60
Bedding, napery and general house-furnishings	3,988 82
Brooms, brushes, mops, soap and cleaning appliances	241 50
Fuel	2,091 32
Light—gas, oil and candles	719 12
Water supply	772 80
Clothing for patients, including boots and shoes	1,609 68
Ice	168 46
Salaries and wages	7,646 41
Insurance and taxes	820 00
Contingencies	1,609 43
Repairs, ordinary	245 61
Advertising, stationery, etc	.....
Coffins and funerals	29 00
Total	$29,005 87

Government grant for 1897	$7,771 04

INSPECTIONS.

I visited this Hospital on the 27th April and found 84 patients in residence —47 boys and 37 girls. The number admitted since the 1st October was 236, and the deaths 12.

All departments were clean and in good order. There were no cases in the contagious or infectious department. There are good fire appliances, bath-rooms, water-closets, etc. The institution is well managed and the records properly kept.

I visited the Lakeside Branch of this Hospital on the 14th August. There were in residence on that day 70 patients—34 boys and 36 girls.

All the rooms, corridors, bath-rooms, water-closets, etc., were in excellent order. The buildings and grounds have been much improved since my last inspection The balconies on the main building have been enlarged and supplied with curtain shades. A new pavilion has been built at the lake shore, and new water mains were being laid.

City water is used and is pumped into tanks from the pumping station. The tanks are in the attic.

The new acetylene gas is manufactured and used in the building and is much more economical than ordinary gas; it was said to be doing well. There is a doctor in residence, and a good staff of nurses. The Home is well managed.

I inspected this Hospital again on the 24th November, when there were 99 patients in residence—60 boys and 39 girls.

The building is well lighted, heated and ventilated, and there is good drainage. All departments were in their usual condition of good order.

Since the 1st October 98 patients have been admitted, and 2 have died. There is a good staff of nurses and a resident medical attendant.

ST. MICHAEL'S HOSPITAL, TORONTO.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment 1st October, 1896	112	
Admitted during the year ending 30th September, 1896	1,252	
Births in the Hospital	51	
Total number under treatment		1,415
Discharges, including infants	1,181	
Died	101	
Under treatment 30th September, 1897	133	
		1,415

Places Received From.

From the City of Toronto	1,226	
From the County of York	43	
From other counties of the Province	133	
From United States	13	
From other countries, including immigrants		
		1,415

Sex.

Male	752	
Female	663	
		1,415

Nationalities

Canadian	822	
English	175	
Irish	295	
Scotch	25	
United States	54	
Other countries	44	
		1,415

Religious Denominations.

Protestant	520	
Roman Catholic	888	
Other religions, or not known	7	
		1,415

The following table gives a summary of certain cases treated in St. Michael's Hospital, Toronto, during the year:

	No. of cases treated.
Typhoid fever	64
Typhus	..
Puerperal	2
Cerebro spinal fever	1
Diphtheria	4
Smallpox	..

Revenue.

From the Government of Ontario	$ 8,001 57
From the City of Toronto, in payment of patients' maintenance	8,180 00
From paying patients themselves	4,929 88
Subscriptions, donations and bequests of private individuals	4,375 40
From all other sources not above enumerated	1,100 19
Total	$26,587 04

Expenditures.

Butchers' meat	2,235 90
Butter	1,403 43
Flour, bread and meal	1,194 71
Milk	1,955 13
Tea and coffee	441 20
Potatoes and other vegetables	629 12
Groceries and provisions, not enumerated	991 89
Drugs and medicines	1,876 64
Medical and surgical appliances	557 52
Surgical instruments	111 41
Beer, wine and spirits	510 25
Bedding, napery and general house furnishings	632 02
Brooms, brushes, mops, soap and cleaning appliances	363 95
Fuel	1,836 05
Light—gas, oil and candles	625 99
Water supply	212 60
Clothing for patients, including boots and shoes	204 66
Ice	109 11
Salaries and wages	2,875 00
Taxes and insurance	133 11
Contingencies	174 86
Repairs, ordinary	698 18
Telephone service	47 00
Interest	919 20
Advertising, printing, stationery, etc., etc	
Total	$20,738 93

Government grant for 1897	$ 9,745 09

INSPECTIONS.

I made an inspection of the St. Michael's Hospital, Toronto, on the 27th April. There were 99 patients (40 males and 59 females) under treatment. The admissions since the 1st October were 114, and the deaths 74.

The private rooms, public wards, operating-room, dispensary, beds, bedding, etc., were clean and in good order. The usual spring cleaning was in progress and the necessary repairs being made. New water-closets, bath-rooms, and wash-stands have been put in the old part of the building during the season. The premises are well lighted, heated and ventilated.

The books were properly entered up.

I inspected this Hospital again on the 25th November. There were in residence on that day 112 patients—53 men, 52 women and 7 children. Since the 1st October the admissions were 186, and the deaths 11.

The private rooms and public wards, dining and sitting rooms, wash and bath-rooms, operating room and dispensary were all in good condition.

A house has been secured, convenient to the Hospital, to be used as a residence for the nurses and attendants, and this will give more accommodation for the sick in the main building.

CITY HOSPITAL, HAMILTON.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	70	
Admitted	928	
Births in the Hospital	44	
Total number under treatment	——	1,042
Discharged	894	
Died	73	
Under treatment, 30th September, 1897	75	
	——	1,042

Places Received From.

From the City of Hamilton, including births in Hospital	994	
From the County of Wentworth	30	
From other counties in the Province	15	
From United States	3	
From other countries	....	
	——	1,042

Sex.

Male	517	
Female	525	
	——	1,042

Nationalities.

Canadian	587	
English	213	
Irish	104	
Scotch	56	
United States	47	
Other countries	35	
	——	1,042

Religious Denominations.

Protestant	836	
Roman Catholic	171	
Other religions	35	
	——	1,042

The following table gives a summary of certain diseases treated in the City Hospital, Hamilton, during the year:

	No. of cases treated.
Typhoid fever	33
Typhus fever	..
Puerperal fever	2
Cerebro spinal fever	..
Diphtheria	28
Smallpox	..

Revenue.

From the Province of Ontario	$5,871 74
From the City of Hamilton	19,223 81
From the County of Wentworth	44 31
From other municipalities	56 50
From paying patients themselves	2,222 37
Total	$27,418 53

Expenditures.

Butchers' meat	$2,744 98
Butter	902 64
Flour, bread and meal	640 33
Milk	898 82
Tea and Coffee	231 75
Potatoes and other vegetables	323 48
Groceries and other provisions not enumerated	1,468 77
Drugs and medicines	1,405 71
Surgical instruments and appliances	467 05
Beer, wine and spirits	142 01
Bedding, etc	1,030 46
Brooms, brushes, mops, soap and cleansing appliances	192 59
Fuel	2,190 82
Light—gas, oil and candles	881 95
Water supply	300 00
Hay and straw	13 50
Clothing for patients, including boots and shoes	131 14
Ice	166 99
Salaries and wages	6,858 02
Taxes and insurance	735 00
Advertising, printing, stationery, etc	.....
Contingencies	.969 22
Repairs, ordinary	1,171 54
Total	$23,866 77
Government grant for 1897	$5,769 29

INSPECTIONS.

I inspected this Hospital on the 17th March, and found that since my last visit considerable improvement has been made.

The basement and cellar have been renovated and fitted up and new water-closets have been put in, replacing the old ones that had become comparatively useless. Other improvements are contemplated, such as removing the old shed further to the rear, taking down the old infectious department building, erecting a new brick building for private rooms and nurses' apartments, operating room, etc.

There were 81 patients in residence, namely, 39 males and 42 females, on the date of this visit. The admissions since the 1st of October were 484, and the deaths 33.

The staff of officers and servants has undergone considerable change since my last inspection. The Hospital is well managed and the books properly kept.

I made the second inspection of this Hospital on the 19th November, when all its departments were clean and in good order.

A new addition has been made to one of the wings, increasing the accommodation for patients.

The Hospital is well managed and the books properly kept.

———

ST. JOSEPH'S HOSPITAL, HAMILTON.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	27	
Admitted	381	
Total number under treatment		408
Discharged	360	
Died	15	
Under treatment 30th September, 1897	33	
		408

Places Admitted From.

From the City of Hamilton	377	
From the County of Wentworth	19	
From other counties in the Province	12	
From the United States	..	
From other countries	..	
		408

Sex.

Male	158	
Female	250	
		408

Nationalities.

Canadian	238	
English	73	
Irish	44	
Scotch	16	
United States	25	
Other countries	12	
		408

Religious Denominations.

Protestant	377	
Roman Catholic	19	
Other religions	12	
		408

The following table gives a summary of certain diseases treated in St. Joseph's Hospital, Hamilton, during the year:

	No. of cases treated.
Typhoid fever	13
Typhus fever	..
Puerperal fever	..
Cerebro spinal fever	..
Diphtheria	..
Smallpox	..

Revenue.

From the Province of Ontario	$2,745 15
From the City of Hamilton	.....
From other municipalities in the Province	.....
From paying patients themselves	2,951 86
Subscriptions, donations and bequests in cash	60 00
Income from endowments, etc., or other property belonging to the Hospital	640 00
Received from other sources	1,489 76
Total	$7,886 77

Expenditures.

Butchers' meat	$ 592 91
Butter	224 67
Flour, bread and meal	379 75
Milk	265 49
Tea and coffee	179 50
Potatoes and other vegetables	313 84
Groceries and other provisions not enumerated	701 92
Drugs and medicines	385 13
Surgical appliances	82 65
Beer, wine and spirits	166 82
Bedding, etc	747 67
Brooms, brushes, mops, soap and cleaning appliances	33 65
Fuel	485 80
Light—gas, oil and candles	205 51
Water supply	30 00
Hay and straw	48 11
Clothing for patients, including boots and shoes	122 63
Ice	18 48
Salaries and Wages	638 67
Taxes, insurance and interest	1,886 14
Coffins and funerals	.....
Contingencies	162 65
Repairs, ordinary	160 77
Total	$7,832 76
Government grant for 1897	$2,518 99

INSPECTIONS.

I inspected this Hospital on the 17th March. There were 32 inmates on that day, namely, 7 males and 25 females. Since the 1st October there have been 161 admissions, and 7 deaths.

The private rooms and public wards, operating room, dispensary, sitting rooms, office, kitchen, laundry, wash and bath-rooms, water-closets, etc, were all in good order.

There has been no change in the building or grounds since my last visit. The heating, lighting, ventilation and drainage are satisfactory. Books properly kept, management good.

I inspected this Hospital on the 19th November. The private rooms and public wards were neat and clean, likewise the dispensary, sitting room, laundry, kitchen, wash rooms, bath-rooms and water-closets. There were 22 patients in residence—8 men and 14 women. The medical attendance and nursing are all that could be desired.

GENERAL HOSPITAL, KINGSTON.

The following summaries show the operations of this Hospital during the official year :

Movements of Patients.

Number under treatment 1st October, 1896	72	
Admitted	1,208	
Births in Hospital	48	
Total number under treatment		1,328
Discharged	1,222	
Died	40	
Under treatment 30th September, 1897	66	
		1,328

Places Received From.

From the City of Kingston (including births)	763	
From the County of Frontenac	265	
From other counties of the Province	287	
From the United States	9	
From other countries	4	
		1,328

Sex.

Male	585	
Female	743	
		1,328

Religious Denominations.

Protestant	1,183	
Roman Catholic	143	
Other religions (or not known)	2	
		1,328

Nationalities.

Canadian	1,172	
English	67	
Irish	52	
Scotch	24	
United States	10	
Other countries	3	
		1,328

The following table gives a summary of certion diseases treated in the General Hospital, Kingston, during the year :

	No. of cases treated.
Typhoid fever	41
Typhus fever	..
Puerperal fever	..

Cerebro spinal fever	..
Diphtheria	118
Smallpox	..

Revenue.

From the Province of Ontario	$4,174 73
From the Dominion Government	235 80
From the County of Frontenac	400 00
Form the City of Kingston	1,200 00
From other municipalities of the Province	490 00
From patients themselves for treatment	4,426 13
Income from endowment and other property of the Hospital	307 30
Subscriptions, donations and bequests	1,222 69
From all other sources not enumerated	1,703 73
Total	$14,160 38

Expenditures.

Butchers' meat	$1,021 39
Butter	714 45
Flour, bread and meal	514 45
Milk	691 27
Tea and coffee	254 24
Potatoes and other vegetables	437 46
Groceries and provisions, not enumerated	1,760 99
Drugs and medicines	679 75
Surgical instruments and appliances	426 54
Beer, wine and spirits	80 15
Bedding, napery and general house furnishings	651 23
Brooms, brushes, mops, soap and cleaning appliances	212 20
Fuel	1,983 15
Light—gas, oil and candles	456 53
Water supply	127 75
Straw	7 50
Clothing for patients	2 00
Ice	41 00
Salaries and wages	3,215 31
Insurance and taxes	152 00
Coffins and funerals	.....
Contingencies	825 65
Repairs, ordinary	92 57
Total	$14,347 58
Government grant for 1897	$3,963 96

INSPECTIONS.

I inspected this Hospital on the 29th March, and found 67 patients in residence—26 males and 41 females. Since the 1st of October 577 had been admitted, and 5 had died. Scarlet fever and diphtheria have been epidemic lately, and the rooms were being disinfected at the time of my visit. The building generally was also being cleaned, calsomined, repaired and repainted.

The maternity department was in good order. Seven cases were waiting confinement; twenty cases had been registered since the commencement of the year.

The operating room, dispensary, officers' and nurses' apartments were in good order.

I inspected the Hospital again on the 28th August, when there were 81 patients—35 males and 46 females. Admitted since the 1st October, 1896, 1,104; deaths, 34.

The private rooms were all occupied. The laundry and morgue were outside in a separate building, also the maternity department.

In the latter there were 22 females. During the year there were 45 births.

The institution was in good order throughout. Books properly kept.

HOTEL DIEU HOSPITAL, KINGSTON.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	56	
Admitted	824	
Total number under treatment		880
Discharged	775	
Died	35	
Under treatment, 30th September, 1897	70	
		880

Places Received From.

From the City of Kingston	506	
From the County of Frontenac	248	
From other counties of the Province	112	
From United States	11	
From other countries	3	
		880

Sex.

Male	406	
Female	474	
		880

Nationalities.

Canadian	616	
English	80	
Irish	149	
Scotch	12	
United States	20	
Other countries	3	
		880

Religious Denominations.

Protestant	229	
Roman Catholic	651	
		880

The following table gives a summary of certain diseases treated in the Hotel Diēu Hospital, Kingston, during the year:

	No. of cases treated.
Typhoid fever	24
Typhus fever	..
Puerperal fever	..

Cerebro spinal fever	1
Diphtheria	37
Smallpox	..

Revenue.

From the Province of Ontario	$5,144 22
From the City of Kingston	400 00
From County of Frontenac	200 00
From patients themselves, for maintenance and treatment	1,822 10
Income from investments	471 00
Subscriptions donations and bequests	3,943 43
From other sources not enumerated	2,463 02
Total	$14,443 71

Expenditures.

Butchers' meat	$1,540 36
Butter	780 00
Flour, bread and meal	950 00
Milk	721 10
Tea and coffee	430 00
Potatoes and other vegetables	397 50
Groceries and provisions not enumerated	2,350 70
Drugs and medicines	738 80
Medical and surgical appliances / Surgical instruments	175 38
Beer, wine and spirits	251 18
Bedding, napery and general house furnishings	1,261 14
Brooms, brushes, mops, soap and cleaning appliances	413 70
Fuel	911 00
Light—gas, oil and candles	344 87
Water supply	100 00
Hay and straw	150 95
Clothing for patients, including boots and shoes	698 61
Ice	15 90
Salaries and wages	340 00
Taxes and insurance	219 00
Coffins and funerals	5 75
Contingencies	648 25
Repairs, ordinary	945 50
Postage, telegraphing, telephone, express, stationery etc	.....
Total	$14,389 69

Government grant for 1897	$5,008 30

INSPECTIONS.

My first inspection of this Hospital for the year was made on the 29th March, when I found it in good order. There were 53 patients in residence on that day—24 males and 29 females.

The private and public rooms, dispensary, operating room, etc., were in well kept condition.

Since the first October there were 351 admissions and twenty-two deaths.

I inspected this hospital the second time on the 22nd August and saw the patients then in residence—thirty-seven in number. Since the 1st October, 1896, the number admitted was 740; deaths, thirty-three.

All departments were clean and in good order.

A new wing is being built to the west, from the southern extension, for the use of the sisters in attendance. This will leave the whole of the present building for hospital work and forty more beds available for patients. It is also the intention of the management to build a fine operating room another season.

GENERAL PROTESTANT HOSPITAL, OTTAWA.

The following summaries show the operations of this Hospital during the official year.

Movements of Patients.

Number under treatment, 1st October, 1896	53	
Admitted	676	
Births in the Hospital	....	
Total number under treatment		729
Discharged	625	
Died	44	
Under treatment 30th September, 1897	60	
		729

Places Admitted From.

From the City of Ottawa	480	
From the County of Carleton	62	
From other counties in the Province	123	
Other parts of the Dominion	52	
Other countries, including emigrants and aliens	12	
		729

Sex.

Male	389	
Female	340	
		729

Nationalities.

Canadian	492	
English	93	
Irish	56	
Scotch	24	
United States	13	
Other countries	51	
		729

Religious Denominations.

Protestant	557	
Roman Catholic	103	
Other religions, or not known	69	
		729

The following table gives a summary of certain diseases treated in the General Protestant Hospital, Ottawa, during the year:

	No. of cases treated.
Typhoid fever	54
Typhus "	..
Puerperal "	..

Cerebro spinal fever	..
Diphtheria	74
Smallpox	..

Revenue.

From the Province of Ontario	$4,538 22
From the City of Ottawa	2,523 52
From the County of Carleton	500 00
From other municipalities	150 00
From patients themselves for maintenance and treatment	1,804 44
Income and endowments	.....
Subscriptions, donations and bequests of private individuals	7,221 89
From other sources not enumerated	2,178 59
Total	$18,916 66

Expenditures.

Butchers' meat	$1,006 37
Butter	448 28
Flour, bread and meal	39 72
Milk	782 52
Tea and coffee	142 11
Potatoes and other vegetables	13 00
Groceries and provisions not enumerated	537 89
Drugs and medicines	1,609 46
Medical and surgical appliances	.....
Surgical instruments	183 74
Beer, wine and spirits	158 32
Bedding, napery and general house furnishings	191 11
Brooms, brushes, mops, soap and cleaning appliances	6 00
Fuel	1,298 66
Light—gas, oil and candles	340 37
Water supply	130 35
Hay and straw	20 00
Clothing for patients, including boots and shoes	.....
Ice	.....
Salaries and wages	6,428 84
Taxes and insurance	68 52
Coffins and funerals	85 00
Contingencies	885 76
Repairs, ordinary	204 60
Postage, telegraphing, telephone, express, stationery, etc., etc.	.....
Total	$14,932 62

Government grant for 1897 ..... $3,722 97

Inspections.

My first inspection of this Hospital for the year was made on the 26th January, on which occasion I found 46 patients in residence—22 men, 21 women and 3 children.

The admissions since the first of the year were 197, and the deaths 12.

The institution was in good order throughout.

I found that the medical staff which resigned on the 15th December last has left the Hospital without a regular medical staff. Two doctors of the city, however, are in attendance, together with the medical superintendent.

There are some other defects in the management, and the regulations governing the Hospital, which I pointed out to the chairman of the board, and which he promised to have remedied at the earliest possible date.

I examined the plans of the new wing which it is proposed to build during the year; and found them very suitable and well arranged for hospital work.

I made another inspection of this Hospital on the 22nd September. On that day there were 50 patients in the wards—24 males and 26 females.

Admitted since the 1st October last, 658; the deaths during the same period were 46.

The new wing, which is nearly completed, will afford accommodation for about 75 more patients.

There were three patients in the contagious department.

All departments of the Hospital were in satisfactory order, and the books properly kept.

ROMAN CATHOLIC HOSPITAL, OTTAWA.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	59	
Admitted	945	
Total number under treatment		1004
Discharged	857	
Died	77	
Under treatment, 30th September, 1897	70	
		1004

Places Received From.

From the City of Ottawa	810	
From the County of Carleton	139	
From other counties in the Province	23	
From the United States	12	
From other countries	20	
		1004

Sex.

Male	488	
Female	516	
		1004

Nationalities.

Canadian	835	
English	20	
Irish	77	
Scotch	10	
United States	14	
Other countries	48	
		1004

Religious Denominations.

Protestant	20	
Roman Catholic	984	
Other religions	....	
		1004

The following table gives a summary of certain diseases treated in the Roman Catholic Hospital, Ottawa, during the year:

	No. of cases treated.
Typhoid fever	78
Typhus fever	....
Puerperal fever	3
Cerebro spinal fever	....
Diphtheria	118
Smallpox	....

Revenue.

From the Province of Ontario	$4,422 28
From the City of Ottawa	1,200 00
From the County of Carleton	250 00
From other municipalities	.....
From patients themselves for maintenance and treatment	2,919 56
Income from property	149 00
Subscriptions, donations and bequests of private individuals	829 38
From all other sources not enumerated	1,427 19
Total	$11,197 41

Expenditures.

Butchers' meat	$1,770 25
Butter	712 82
Flour, bread and meal	558 39
Milk	1,009 07
Tea and coffee	205 00
Potatoes and other vegetables	229 00
Groceries and provisions not enumerated	653 67
Drugs and medicines	993 70
Medical and surgical appliances	108 23
Surgical instruments	.....
Beer, wine and spirits	112 46
Bedding, napery and general house furnishings	194 89
Brooms, brushes, mops, soap and cleaning appliances	159 64
Fuel	.....
Light—gas, oil, candles	302 00
Water supply	124 88
Hay and straw	34 20
Clothing for patients. including boots and shoes	.....
Ice	.....
Salaries and wages	1,848 00
Taxes and insurance	224 09
Coffins and funerals	.....
Contingencies	31 00
Repairs, ordinary	89 79
Advertising, printing, stationery, postage, etc	.....
Total	$9,361 08
Government grant for 1897	$4,675 28

INSPECTIONS.

At my inspection of this Hospital, on the 25th January, the wards contained fifty-three patients—twenty-nine males and twenty-four females. The admissions since the 1st October were 218, and the deaths fourteen.

All the private rooms and public wards, operating room, dispensary, bathrooms. water closets, etc, were in excellent order. The books were properly kept

Plans have been approved and preparations are being made for the erection of a wing as soon as the weather will permit.

I inspected this Hospital on the 21st September. On that occasion there were sixty-two patients under treatment—thirty males and thirty-two females. Since the 1st October 1996 there were 778 admissions and fifty-eight deaths.

All departments were clean and in good condition. The building is well lighted, heated and drained.

The new wing is nearly completed and will add greatly to the accommodation of the Hospital.

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HOUSE OF MERCY LYING-IN HOSPITAL, OTTAWA.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	32	
Admitted	189	
Births in Hospital	164	
Total number under treatment		385
Discharged	345	
Died	10	
Under treatment, 30th September, 1897	30	
		385

Places Received From.

From the City of Ottawa	123	
From the County of Carleton	21	
From other counties in the Province	188	
From the United States	13	
From other countries	40	
		385

Sex.

Male	76	
Female	309	
		385

Nationalities.

Canadian	163	
English	62	
Irish	109	
Scotch	41	
United States	....	
Other countries	10	
		385

Religious Denominations.

Protestant	101	
Roman Catholic	284	
		385

The following table gives a summary of certain diseases treated in the House of Mercy Lying-in Hospital, Ottawa, during the year:

	No. of cases treated.
Typhoid fever	....
Typhus "	...
Puerperal "	2
Cerebro spinal fever	....
Diphtheria	....
Smallpox	....

Revenue.

From the Province of Ontario	$1,587 59
From the County of Carleton	50 00
From paying patients themselves	1,029 10
Income and investments	
From subscriptions and donations	3,725 36
From other sources	2,166 82
	$8,558 87

Expenditures.

Butchers' meat	$686 51
Butter	310 33
Flour, bread and meal	332 54
Milk	398 53
Tea and coffee	186 67
Potatoes and other vegetables	298 46
Groceries and provisions, not enumerated	510 38
Drugs and medicines	95 10
Medical and surgical appliances	
Surgical instruments	14 50
Beet, wine and spirits	47 76
Bedding, napery and general house-furnishings	862 34
Brooms, brushes, mops, soap and cleaning appliances	192 34
Fuel	450 00
Light—gas, oil and candles	87 15
Water supply	129 36
Hay and straw	94 73
Clothing for patients, including boots and shoes	98 94
Advertising, stationery, etc	75 00
Salaries and wages	745 30
Taxes, insurance and interest	33 10
Coffins and funerals	25 00
Contingencies	208 08
Repairs, ordinary	416 81
Ice supply	20 75
Total	$6,319 68
Government grant for 1897	1,701 12

INSPECTIONS.

On the 27th January I inspected this Hospital and found therein forty-six adult females. The admissions since the first of the year were sixty-four; no deaths.

The private and public rooms, sitting room, bath and wash rooms, water-closets, etc., were all in well kept order. The improvements made last year in drainage, ventilation and plumbing have put the building in an excellent sanitary condition. A doctor is in attendance at all cases of confinement. The books are properly kept.

I made another inspection of the Hospital on the 23rd September. The inmates on that day were thirty women and one infant.

The admissions during the year were 181, and the deaths ten—three adults and seven infants.

The Hospital was in its usual condition of good order, and the books were entered up.

GENERAL HOSPITAL, LONDON.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	55	
Admitted	761	
Births in the Hospital	26	
Total number under treatment		842
Discharged	722	
Died	65	
Under treatment, 30th September, 1897	55	
		842

Places Received from.

From the City of London	641	
From the County of Middlesex	150	
From other counties in the Province	47	
United States	4	
Other countries	..	
		842

Sex.

Male	438	
Female	404	
		842

Nationalities.

Canadian	546	
English	163	
Irish	61	
Scotch	32	
United States	20	
Other countries	20	
		842

Religious Denominations.

Protestant	744	
Roman Catholic	83	
Other religions	15	
		842

The following table gives a summary of certain diseases treated in the General Hospital, London, during the year:

	No. of cases treated.
Typhoid fever	41
Typhus fever	....
Puerperal fever	1
Cerebro spinal fever	....
Diphtheria	99
Smallpox	....

Revenue.

From the Province of Ontario	$3,756 23
From the City of London	6,953 16
From the County of Middlesex, in payment for patients	1,591 54
From paying patients themselves	4,069 15
From income from property or investments	402 64
Subscriptions, donations and bequests	.... ..
Total	$16,772 72

Expenditures.

Butchers' meat	$1,504 07
Butter	491 68
Flour, bread and meal	438 61
Milk	676 53
Tea and Coffee	271 45
Potatoes and other vegetables	176 87
Groceries and provisions not enumerated	917 44
Drugs and medicines	1,689 87
Surgical instruments	.... ..
Medical and surgical appliances	437 49
Beer, wine and spirits	262 75
Bedding, napery and general house furnishings	1,218 48
Brooms, brushes, mops, soap and cleaning appliances	236 05
Fuel	1,245 20
Light—gas, oil and candles	592 52
Water	150 00
Hay and straw	19 25
Clothing for patients	.... ..
Ice	91 29
Salaries and wages	5,108 75
Taxes and insurance	70 40
Coffins and funerals	13 00
Contingencies	537 93
Repairs, ordinary	623 09
Total	$16,772 72
Government grant for 1897	$3,037 06

INSPECTIONS.

I made an inspection of this Hospital on the 22nd May. On that day there were fifty-seven inmates—twenty-six males and thirty-one females, Admitted since the 1st October, 494; deaths during same period, thirty-six.

I found no change in building or grounds since my last visit.

The wards, public and private, and all departments of the hospital were clean and in good order.

The authorities expect to build a new hospital in the near future. This is very much needed, as the present building is not suited for hospital work.

I inspected the hospital on the 10th September. The building is old and dilapidated and very ill-suited for the work, and new premises should be erected as soon as possible. The present hospital is very inconvenient as regards the management and disposition of patients. It is as well kept as can be expected under the circumstances. Books properly kept.

ST. JOSEPH'S HOSPITAL, LONDON.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	29	
Admitted	336	
Total number under treatment		365
Discharged	335	
Died	20	
Under treatment, 30th September, 1897	10	
		365

Places Admitted From.

City of London	191	
County of Middlesex	120	
Other counties	54	
United States	....	
Other countries	....	
		365

Sex.

Male	138	
Female	227	
		365

Nationalities.

Canadian	277	
English	21	
Irish	26	
Scotch	7	
United States	12	
Other countries	22	
		365

Religious Denominations.

Protestant	214	
Roman Catholic	151	
		365

The following table gives a summary of certain diseases treated in the St. Joseph's Hospital, London, during the year:

	No. of cases treated.
Typhoid fever	30
Typhus fever	....
Puerperal fever	2
Cerebro spinal fever	....
Diphtheria	3
Smallpox	....

Revenue.

From the Province of Ontario	$2,197 90
From the City of London	.....
From the County of Middlesex	.....
From paying patients	6,020 83
Income from property	.....
Subscriptions, donations, etc	10 00
Other sources	1,027 36
Total	$9,256 09

Expenditures.

Butchers' meat	$ 753 01
Butter	275 23
Flour, bread and meal	388 49
Milk	357 10
Tea and coffee	216 56
Potatoes and other vegetables	139 65
Groceries and provisions not enumerated	611 30
Drugs and medicines	587 83
Surgical instruments	.....
Medical and surgical appliances	26 85
Beer, wine and spirits	103 90
Bedding, napery and general house furnishings	575 67
Brooms, brushes, mops, soap and cleaning appliances	29 47
Fuel	636 05
Light—gas, oil and candles	196 75
Water	126 14
Hay and straw	.....
Clothing for patients	166 01
Ice	15 00
Salaries and wages	865 59
Taxes and insurance	.....
Coffins and funerals	26 00
Contingencies	2,391 41
Repairs, ordinary	228 05
Total	$8,716 06
Government aid for 1897	$2,121 03

INSPECTIONS.

I made an inspection of the St. Joseph's Hospital, London, on the 21st May. On that day there were 26 patients in the wards, 11 male and 15 females. Since the 1st October 216 were admitted, and there were 13 deaths.

All departments, private rooms and public wards, were clean and in good condition, and the institution is well managed. The books are properly kept.

This Hospital was inspected by me on the 10th September.

There were under treatment on that day 8 males and 18 females.

The number admitted since the first of the year was 327, and the deaths were 16.

The private rooms, public wards, dining rooms, operating room, dispensary, wash rooms, bath rooms, and water closets, were all clean and in good order. The heating, lighting, ventilation and drainage are very satisfactory.

GENERAL AND MARINE HOSPITAL, ST. CATHARINES.

The following summaries show the operations of this Hospital during the officiai year:

Movements of Patients.

Number under treatment 1st October, 1896	17	
Admitted	321	
Births in Hospital	11	
Total number under treatment		349
Discharged	303	
Died	28	
Under treatment, 30th September, 1897	18	
		349

Places Admitted From.

From the City of St. Catharines	169	
From the County of Lincoln	81	
From other counties in the Province, and sailors	81	
From the United States	12	
From other countries	6	
		349

Sex.

Male	174	
Female	175	
		349

Nationalities.

Canadian	237	
English	46	
Irish	33	
Scotch	7	
United States	18	
Other countries	8	
		349

Religious Denomination.

Protestant	263	
Roman Catholic	86	
Other religions (or not known)	....	
		349

The following table gives a summary of certain diseases treated in the General and Marine Hospital, St. Catharines, during the year:

	No. of cases treated.
Typhoid fever	19
Typhus fever	....
Puerperal fever	....
Cerebro spinal fever	....
Diphtheria	....
Smallpox	....

Revenue.

From the Province of Ontario	$1,834 42
From the Dominion Government	500 00
From the City of St. Catharines	600 00
From the County of Lincoln	500 00
From other municipalities, County of Welland	300 00
From patients themselves for maintenance and treatment	2,555 93
From endowments, investments. or other property belonging to the Hospital	21 14
From subscriptions, bequests and donations of private persons	5,394 82
From all other sources not above enumerated	893 99
Total	$12,600 30

Expenditures.

Butchers' meat	963 85
Butter and eggs	476 18
Flour, bread and meal	256 45
Milk	434 00
Tea and coffee	169 74
Potatoes and other vegetables	117 85
Groceries and provisions not enumerated	582 05
Drugs and medicines	714 19
Medical and surgical appliances	272 88
Surgical instruments and dressing materials	87 60
Beer, wine and spirits	63 15
Bedding, napery and general house furnishings	286 30
Brooms, brushes, mops, soap and cleaning appliances	106 91
Fuel	426 78
Light—gas, oil and candles	396 04
Water supply	28 27
Hay and straw	5 00
Clothing for patients	.....
Ice	36 00
Salaries and wages	2,178 75
Taxes and insurance	67 10
Contingencies	488 73
Stationery, advertising, printing, postage, etc.	.....
Repairs, ordinary	410 29
Total	$8,566 11
Government grant for 1897	$1,360 21

INSPECTIONS.

I made an inspection of this Hospital on the 20th February. There were then under treatment 22 patients—10 men and 12 women.

Since the 1st October the admissions were 140; deaths, 11.

All the rooms and public wards were in good order.

New bedsteads, properly constructed for hospital use, are much required

The records were properly entered up.

I instructed Mr. Nicholson to inspect this Hospital. A copy of his report is annexed.

I beg leave to state that I made an Inspection of the Hospital on the 7th September. There were under treatment on that day eight males and eleven females. Four were surgical cases, and three typhoid. Three hundred and twenty-eight patients have been under treatment since the 1st October I found the Hospital in good order in every part.

The nurses, home has been newly papered.

GALT HOSPITAL, GALT.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment 1st October, 1896	19	
Admitted	265	
Number of births in the Institution	4	
Total number under treatment		288
Discharged	253	
Died	16	
Under treatment, 30th September, 1897	19	
		288

Places Received From.

From the Town of Galt	184	
From the County of Waterloo	76	
Other counties	23	
United States	4	
Other countries	1	
		288

Sex.

Male	116	
Female	172	
		288

Nationalities.

Canadian	229	
English	30	
Irish	1	
Scotch	12	
United States	7	
Other countries	9	
		288

Religious Denominations.

Protestant	266	
Roman Catholic	22	
Other religions, or not known	....	
		288

The following table gives a summary of certain diseases treated in the Galt Hospital, Galt, during the year:

Typhoid fever	41
Typhus fever	....
Puerperal fever	....
Cerebro spinal fever	....
Diphtheria	....
Smallpox	....

Revenue.

From the Province of Ontario	$1,203 80
From the Town of Galt	1,000 00
From the County of Waterloo	1,000 00
From paying patients themselves	2,433 57
From subscriptions, bequests and donations of private individuals	950 90
From other sources	.....
Total	$6,588 27

Expenditures.

Butchers' meat	$352 85
Butter	136 85
Flour, bread and meal	175 17
Milk	90 76
Tea and coffee	90 96
Potatoes and other vegetables	53 33
Groceries and provisions, not enumerated	402 56
Drugs, medicines and surgical appliances, etc.	583 28
Beer, wine and spirits	104 20
Bedding, napery and general house furnishings	288 28
Brooms, brushes, mops, soap and cleaning appliances	50 04
Fuel	654 99
Light—gas, oil and candles	425 00
Water	40 00
Hay and Straw	150 90
Clothes for patients, including boots and shoes	.....
Ice	68 28
Salaries and wages	1,628 86
Taxes and insurance	22 00
Coffins and funerals	.....
Contingencies, advertising, postage, etc	142 31
Repairs, ordinary	196 44
Total	$5,657 66

Government aid for 1897 ..... $1,430 60

INSPECTIONS.

I instructed Mr. Nicholson to make the first inspection of this Hospital. A copy of his report is annexed:

I made an inspection of the Galt Hospital on the 3rd June. There were 14 patients in residence on that day, namely, 5 men, 8 women and 1 child. Since the 1st October, 186 had been admitted, and 8 had died.

This Hospital is beautifully situated on high ground overlooking the town, and its wards are bright, clean and airy.

The new wing is now completed and occupied. An elevator is to be placed in the building before long. The laundry and morgue are in a separate building. There is a good staff of medical men and nurses. The books are properly kept.

Another inspection of this Hospital was made by me on the 14th October. There were 7 male and 12 female patients under treatment. Since the 1st October, 1896, there were 279 admissions and 16 deaths.

A new wing has been added to this Hospital during the past year and is well fitted up. An elevator is to be used in it.

Two new hot-water heaters have been placed in the basement, and the kitchen has been enlarged.

Speaking tubes have also been placed in the rooms.

All departments were clean and in good order.

GENERAL HOSPITAL, GUELPH.

The following summaries show the operations of this Hospital during the official year :

Movements of Patients.

Number under treatment, 1st October, 1896	42	
Admitted	476	
Births in the Hospital	20	
Total number under treatment		538
Discharged	479	
Died	29	
Under treatment, 30th September, 1897	30	
		538

Places Received From.

City of Guelph	325	
County of Wellington	170	
Other counties in the Province	43	
From United States	..	
From other countries, foreigners and aliens	..	
		538

Sex.

Male	261	
Female	277	
		538

Nationalities.

Canadian	418	
English	49	
Irish	23	
Scotch	30	
United States	8	
Other countries	10	
		538

Religious Denominations.

Protestant	505	
Roman Catholic	32	
Other religions (or not known)	1	
		538

The following table gives a summary of certain diseases treated in the General Hospital, Guelph, during the year :

	No. of cases treated.
Typhoid fever	26
Typhus fever	..
Puerperal fever	..
Cerebro spinal fever	..
Diphtheria	18
Smallpox	..

Revenue.

From the Province of Ontario	$3,279 51
From the City of Guelph	1,150 00
From the County of Wellington	1,000 00
From paying patients themselves	3,688 45
From subscriptions, bequests and donations of private individuals	926 65
From other sources	250 13
Total	$10,294 74

Expenditures.

Butchers' meat	$1,021 67
Butter	.....
Flour, bread and meal	296 74
Milk	34 99
Tea and coffee	.....
Potatoes and other vegetables	165 56
Groceries and provisions, not enumerated	1,172 71
Drugs, medicines and surgical appliances, etc	866 42
Beer, wine and spirits	160 44
Bedding, napery and general house furnishings	285 94
Brooms, brushes, mops, soap and cleaning appliances	.....
Fuel	824 96
Light—gas, oil and candles	547 94
Water	30 00
Hay and straw	30 16
Clothes for patients, including boots and shoes	.....
Ice	26 00
Salaries and wages	2,953 98
Taxes and insurance	1 70
Coffins and funerals	.....
Contingencies, advertising, postage, etc	907 33
Repairs, ordinary	160 70
Total	$9,487 24
Government aid for 1897	$3,048 19

INSPECTIONS.

The General Hospital, Guelph, was inspected by me on the 1st March. The new wing is completed and opened this day.

All the rooms, public and private, are conveniently arranged.

They are well lighted, heated and ventilated. The elevator runs from the basement to the attic. There are three flats; supplied with good bath rooms, wash rooms and water closets. There are also ward pantries on each flat. The furnishing is of the best quality, and the plumbing, drainage, steam heating, electric and gas fixtures are very complete. There are thirty-five beds in the new wing. The bedsteads are new and were made specially for hospital use by the Central Prison factory.

In the old portion of the hospital there were 48 patients—21 men, 24 women and 3 children.

The old and new parts combined will accommodate 100 patients.

The new wing has cost over $20,000. Its dimensions are 65 feet by 83 feet. Iron doors have been placed in each flat between the new wing and the old building.

The laundry and contagious department are situated on the premises convenient to the hospital.

This institution is now very complete and not surpassed by any hospital of its size in the Province. There is a resident medical superintendent and a good medical staff in attendance.

The records were properly entered up.

I instructed Mr. Mann to make an inspection of this Hospital. A copy of his report is annexed.

The Guelph General Hospital was inspected by me on the 17th September, 1897, on which occasion there were 40 patients undergoing treatment, viz., 19 males and 21 females, many of these were approaching convalescence.

A fine new wing has been added to this Hospital, which is a very great acquisition. New fire escapes have been also erected.

A portion of the Grounds have been levelled as recommended by you.

The Hospital was found in good order, and the books properly kept.

ST. JOSEPH'S HOSPITAL, GUELPH.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	35	
Admitted	265	
Total number under treatment		300
Discharged	260	
Died	17	
Under treatment, 30th September, 1897	23	
		300

Places Admitted From.

City of Guelph	177	
County of Wellington	41	
Other counties	82	
Other countries, United States	....	
		300

Sex.

Male	129	
Female	171	
		300

Nationalities.

Canadian	226	
English	18	
Irish	30	
Scotch	10	
United States	6	
Other countries	10	
		300

Religious Denominations.

Protestant	74	
Roman Catholic	226	
		300

The following table gives a summary of certain diseases treated in the St. Joseph's Hospital, Guelph, during the year:

	No. of cases treated.
Typhoid fever	27
Typhus "	..
Puerperal "	..
Cerebro spinal fever	..
Diphtheria	..
Smallpox	..

Revenue.

From the Province of Ontario	$2,593 69
From the City of Guelph	100 00
From the County of Wellington	500 00
From paying patients	1,894 33
Income from property	.....
Subscriptions, donations, etc	1,367 21
Other sources	1,842 93
Total	$8,298 16

Expenditures.

Butchers' meat	$ 826 43
Butter	173 85
Flour, bread and meal	637 06
Milk	106 34
Tea and coffee	248 65
Potatoes and other vegetables	180 20
Groceries and provisions, not enumerated	1,185 16
Drugs and medicines and surgical appliances	628 14
Beer, wine and spirits	204 54
Bedding, napery and general house furnishings	308 42
Brooms, brushes, mops, soap and cleaning appliances	117 01
Fuel	1,465 70
Light—gas, oil and candles	107 18
Hay and straw	.....
Clothing for patients, including boots and shoes	211 91
Ice	.....
Salaries and wages	582 19
Taxes and insurance	29 40
Contingencies	1,170 78
Repairs, ordinary	115 20
Advertising, printing, stationery, postage, etc.	.....
Total	$8,298 16
Government grant for 1897	$1,661 95

INSPECTIONS.

I made an inspection of this hospital on the 1st March, when there were 22 patients in residence, namely, 10 men, 11 women and 1 child. Admissions since the 1st October, 109 ; deaths 8.

All departments of the hospital were thoroughly clean and in good order. The books were properly kept. A good work is being done by this hospital. I have the honor,

I instructed Mr. Mann to make a second inspection of this hospital. A copy of his report is annexed :

When inspecting this hospital on the 17th September, 1897. I found there were 20 patients undergoing treatment, viz., 8 males and 12 females. There were no infectious diseases at the time, but had been some scarlet fever cases during January last.

Everything was in a good state of repair, and the books were properly

GENERAL HOSPITAL PEMBROKE.

The following summaries show the operations of this Hospital during the official year.

Movements of Patients.

Number under treatment, 1st October, 1896	31	
Admitted	261	
Total number under treatment		292
Discharged	257	
Died	9	
Under treatment, 30th September, 1897	26	
		292

Places received from.

From the Town of Pembroke	63	
From the County of Renfrew	147	
Other counties	82	
United States	....	
Other countries	....	
		292

Sex.

Male	136	
Female	156	
		292

Nationalities.

Canadian	213	
English	23	
Irish	48	
Scotch	8	
United States	....	
Other countries	....	
		292

Religious Denominations.

Protestant	79	
Roman Catholic	213	
		292

The following table gives a summary of certain diseases treated in the General Hospital, Pembroke, during the year:

	No. of cases treated.
Typhoid fever	26
Typhus	..
Puerperal	..
Cerebro spinal fever	..
Diphtheria	..
Smallpox	..

Revenue.

From the Province of Ontario	$1,788 08
From the County of Renfrew and Pontiac	200 00
From the City of Quebec	.....
From patients themselves	1,245 37
From subscriptions, bequests and donations of private individuals	816 65
From all other sources	399 28
Total	$4,449 38

Expenditures.

Butchers' meat	$448 88
Butter	230 24
Flour, bread and meal	247 50
Milk	115 00
Tea and coffee	135 20
Potatoes and other vegetables	129 40
Groceries and provisions, not enumerated	355 42
Drugs, medicines and surgical appliances	397 95
Beer, wines and spirits	65 80
Bedding, napery and general house furnishings	240 00
Brooms, brushes, mops, soap and cleaning appliances	69 15
Fuel	447 88
Light—gas, oil and candles	73 65
Water	50 80
Hay and straw	128 28
Clothing for patients, including boots and shoes	19 00
Ice	20 00
Salaries and wages	816 00
Advertising	26 55
Coffins and funerals	25 00
Contingencies	108 40
Repairs, ordinary	121 45
Total	$4,271 55
Government grant, 1897	$1,739 78

INSPECTIONS.

This Hospital was inspected by me on the 28th January, when there were 17 patients (9 men and 8 women) under treatment: Admitted since the first of the year, 72: Died 3.

There was no change to be noted in the building or grounds since my last inspection. It is well lighted, heated and ventilated, but the drainage is bad. It is the intention to improve the latter as soon as spring opens.

All the rooms were clean and in good order, and the books properly kept.

I visited this Hospital again on the 7th September. There was no change to note as regards the building or grounds, since my last inspection. On this occasion there were 18 patients under treatment—9 males and 9 females. Admitted since the beginning of the year, 239; deaths 9.

All parts of the building were in good order.

GENERAL HOSPITAL, MATTAWA.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	18	
Admitted	253	
Total number under treatment		271
Discharged	252	
Died	8	
Under treatment, 30th September, 1897	11	
		271

Places Received from.

From the Town of Mattawa	194	
From the District of Nipissing	55	
From other counties in the Province	22	
United States and other countries	..	
		271

Sex.

Male	203	
Female	68	
		271

Nationalities.

Canadian	212	
English	9	
Irish	47	
Scotch	..	
United States	..	
Other countries	3	
		271

Religious Denominations

Protestant	19	
Roman Catholic	252	
Other religions (or not known)	..	
		271

The following table gives a summary of certain diseases treated in the General Hospital, Mattawa, during the year:

	No. of cases Treated
Typhoid fever	9
Typhus fever	..
Puerperal fever	..
Cerebro spinal fever	..
Diphtheria	8
Smallpox	..

Revenue.

From the Province of Ontario	$1,493 56
From the Town of Mattawa	.....
From County	.....
From patients for maintenance and treatment	483 14
From subscriptions, bequests and donations of private individuals	552 32
From other sources	1,400 00
Total	$3,929 02

Expenditure.

Butchers' meat	$575 20
Butter	251 25
Flour, bread and meal	325 10
Milk	122 60
Tea and coffee	150 00
Potatoes and other vegetables	159 25
Groceries and provisions not enumerated	160 00
Drugs, medicines and surgical instruments	116 95
Beer, wine and spirits	48 40
Bedding, napery and general house furnishings	161 05
Brooms, brushes, etc.	22 60
Fuel	219 39
Light—gas, oil and candles	75 25
Water supply	100 71
Hay and straw	101 55
Clothing for patients	185 06
Ice	16 52
Salaries and wages	470 54
Taxes and insurance	50 00
Coffins and funerals	17 00
Repairs, ordinary	190 10
Contingencies	20 78
Total	$3,539 30

Government grant for 1897	$1,085 36

INSPECTIONS.

This Hospital was inspected by me on the 1st June, when there were 9 patients, (7 males and 2 females) under treatment. The number admitted since the 1st October was 163.

The private rooms and public wards, dispensary, sitting-room, dining room, kitchen, bath-rooms and water-closets were all in nice order. The laundry is in a separate brick building. Good drainage and ventilation, and electric light in use.

The books not having been entered up, I could not judge as to the patients' diseases.

I inspected this Hospital on the 2nd November. There were under treatment on that occasion ten males and one female.

The private rooms, public wards, dispensary, sitting-room, kitchen, laundry, bath-rooms and water-closets were clean and in good order. Good drainage and ventilation. Electric light and town water supplied.

Good medical attendance and nursing. Books well kept.

THE JOHN H. STRATFORD HOSPITAL, BRANTFORD.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	21	
Admitted	250	
Births in the Hospital	11	
Total number under treatment		282
Discharged	225	
Died	34	
Under treatment, 30th September, 1897	23	
		282

Places Admited From.

From the City of Brantford	249	
From the County of Brant	33	
Other countries	..	
United States	..	
		282

Sex.

Male	154	
Female	128	
		282

Nationalities.

Canadian	182	
English	43	
Irish	29	
Scotch	12	
United States	9	
Other countries	7	
		282

Religious Denominations.

Protestant	250	
Roman Catholic	24	
Other religions or not known	..	
		282

The following table gives a summary of certain diseases treated in the John H. Stratford Hospital, Brantford, during the year:

	No. of cases treated.
Typhoid fever	31
Typhus	..
Puerperal	..
Cerebro spinal fever	..
Diphtheria	..
Smallpox	..

Revenue.

From the Province of Ontario	$1,923 01
From the City of Brantford	2,000 00
From the County of Brant	500 00
From patients for maintenance and treatment	1,096 87
From subscriptions, donations and bequests from private individuals	500 00
From all other sources	1,043 25
Total	$7,063 13

Expenditures.

Butchers' meat	$ 438 24
Butter	214 59
Flour, bread and meal	147 24
Milk	281 67
Tea and coffee	46 55
Potatoes and other vegetables	45 90
Groceries and provisions not enumerated	241 84
Drugs and medicines	320 15
Medical and surgical appliances	37 46
Surgical instruments	.....
Beer, wine and spirits	88 31
Bedding, napery and general house furnishings	209 53
Brooms, brushes, mops, soap and cleaning appliances	72 27
Fuel	782 89
Light—gas, oil and candles	235 31
Water supply	.....
Hay and straw	.....
Clothing for patients, including boots and shoes	.....
Ice	33 10
Salaries and wages	2,459 50
Taxes and insurance	130 05
Coffins and funerals	.....
Contingencies	185 65
Repairs, ordinary	292 43
Total	$6,262 68
Government grant for 1897	$1,361 68

INSPECTIONS.

I made an inspection of the Hospital on the 18th May, and found 12 patients under treatment, 3 men and 9 women. Since the 1st October, the admissions were 150 and the deaths 24.

The private rooms, public wards, dispensary, operating room, bath rooms, water closets, etc., were in good order.

The death-rate seems to be very high, and I am inclined to think that the sanitary condition of the Hospital is not good.

I inspected this Hospital again on the 13th October, when there were 24 patients in residence, 12 males and 12 females. Since the 1st October, 1896, there were 251 admissions and 34 deaths.

All the different departments were in good order, and the books properly kept.

ST. JOSEPH'S HOSPITAL, PORT ARTHUR.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	11	
Admitted	109	
Total		120
Discharged	105	
Died	8	
Under treatment, 30th September, 1897	7	
		120

Places Admitted From

From the Town of Port Arthur	67	
From the County of Algoma	23	
From other parts of the Province	30	
From the United States	....	
From other countries, including emigrants, foreigners and aliens	....	
		120

Sex.

Male	102	
Female	18	
		120

Nationalities.

Canadian	56	
English	15	
Irish	17	
Scotch	10	
United States	2	
Other countries	20	
		120

Religious Denominations.

Protestant	58	
Roman Catholic	44	
Other denominations	18	
		120

The following table gives a summary of certain diseases treated in the St. Joseph's Hospital, Port Arthur, during the year:

	No. of cases treated.
Typhoid Fever	17
Typhus "	....
Puerperal "	....

Cerebro spinal fever	....
Diphtheria	....
Smallpox	....

Revenue.

From the Province of Ontario	$796 66
From the Town of Port Arthur	400 00
From County of Algoma	150 00
From other municipalities in the Province	....
From paying patients themselves	371 00
From subscriptions, donations, etc	....
From other sources	....
Total	$1,717 66

Expenditures.

Butcher's Meat	$200 00
Butter	102 00
Flour, bread and meal	120 00
Milk	50 00
Tea and coffee	40 00
Potatoes and other vegetables	47 00
Groceries and provisions, not enumerated	130 75
Drugs and medicines	185 60
Surgical instruments and appliances	....
Beer, wine and spirits	75 35
Bedding, etc	80 00
Brooms, brushes, mops, soap and cleaning appliances	75 00
Fuel	225 75
Light—gas, oil and candles	30 00
Water supply	....
Ice supply	....
Hay and straw	50 00
Clothing for patients, including boots and shoes	43 85
Salaries and wages	325 00
Taxes and insurance	45 00
Coffins and funerals	....
Contingencies	10 00
Repairs, ordinary	75 00
Total	$1,910 30
Government grant for 1897	$718 28

INSPECTIONS.

I inspected the St. Joseph Hospital, Port Arthur, on the 30th June. On that day there were six patients—five men and one woman. The number admitted during the year was 59, and the deaths 4.

All departments were clean and in good order, and the books properly kept.

BELLEVILLE HOSPITAL, BELLEVILLE.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	13	
Admitted	246	
Births in Hospital	6	
Total number under treatment		265
Discharged	230	
Died	15	
Under treatment, 30th September, 1897	20	
		265

Places Admitted From.

From the City of Belleville	200	
From the County of Hastings	51	
Other counties	14	
Other countries, United States	....	
		265

Sex.

Male	119	
Female	146	
		265

Nationalities.

Canadian	200	
English	34	
Irish	14	
Scotch	8	
United States	5	
Other countries	4	
		265

Religious Denominations.

Protestant	219	
Roman Catholic	45	
Other religions, or not known	1	
		265

The following table gives a summary of certain diseases treated in the Belleville Hospital during the year:

	No. of cases treated
Typhoid Fever	11
Typhus "	....
Puerperal "	....
Cerebro spinal fever	....
Diphtheria	7
Smallpox	....

Revenue.

From the Province of Ontario	$1,454 47
From the City of Belleville	513 25
From the County of Hastings	7 00
From patients for maintenance and treatment	1,710 34
From subscriptions, donations and bequests from private individuals	748 60
From other resources	....
Total	$4,433 66

Expenditures.

Butcher's meat	$329 67
Butter	236 25
Flour, bread and meal	157 35
Milk	233 58
Tea and coffee	75 70
Potatoes and other vegetables	111 33
Groceries and provisions, not enumerated	329 96
Drugs and medicines	266 90
Medical and surgical applicances	252 35
Beer, wine and spirits	32 24
Bedding, napery and general house furnishings	31 22
Brooms, brushes, mops, soap and cleaning appliances	24 80
Fuel	700 00
Light—gas, oil and candles	253 28
Water	....
Hay and straw	18 00
Clothing for patients	20 29
Ice supply	27 30
Salaries and wages	1,464 35
Taxes and insurance	...
Contingencies	104 79
Coffins and funerals	2 50
Repairs, ordinary	123 18
Total	$4,795 04

Government grant for 1897	$995 12

INSPECTIONS.

I made an inspection of this Hospital on the 18th January and found 18 patients (8 males and 10 females) under treatment.

The admissions since the first of the year were 66; deaths, 4.

There was no change in the building to be noted since my last visit. The public wards and private rooms, dispensary, operating room, sitting room, wash room, bath room and water closets were all in well kept order. The heating, lighting, ventilation and drainage are satisfactory. The books were not fully entered up.

I inspected this Hospital on the 23rd August. The private rooms, public wards, dispensary, operating room, sitting and dining rooms, kitchen, cellar, bath room and water closets were all clean and in good order.

There were 7 male and 7 female patients on this date. Admitted since the 1st October, 1896, 224 patients; 10 deaths: 5 births. Books properly kept.

ST. VINCENT DE PAUL HOSPITAL, BROCKVILLE.

The operations of this Hospital during the period under report are indicated in the following summary:

Remaining under treatment, 1st October, 1896	15	
Admitted	3 44	
Number of births in the Hospital	....	
Total number under treatment		359
Discharged	3 20	
Died	14	
Under treatment on 30th September, 1897	25	
		59

Places Admitted From.

From the Town of Brockville	2 20	
From the Counties of Leeds and Grenville	1 29	
From other Counties in the Province	....	
From United States	10	
		359

Sex.

Male	1 35	
Female	2 24	
		359

Nationalities.

Canadian	2 70	
English	14	
Irish	29	
Scotch	23	
United States	13	
Other countries	10	
		359

Religious Denominations.

Protestant	1 15	
Roman Catholic	2 44	
Other religions (or not known)	....	
		359

The following table gives a summary of certain diseases treated in the St. Vincent de Paul Hospital, Brockville, during the year:

	No. of cases treated.
Typhoid fever	15
Typhus fever	..
Puerperal fever	...
Cerebro spinal fever	..
Diphtheria	7
Smallpox	..

Revenue.

From the Province of Ontario	$1,436 16
From the Town of Brockville	200 00
From the Counties of Leeds and Grenville	200 00
From paying patients themselves	1,388 30
From property belonging to the institution	
Subscriptions, donations and bequests of private individuals in cash	1,802 93
From all sources not enumerated	813 54
	$5,840 93

Expenditures.

Butchers' meat	$529 96
Butter	195 50
Flour, bread and meal	198 30
Milk	225 00
Tea and coffee	110 17
Potatoes and other vegetables	107 42
Groceries and provisions not enumerated	510 08
Drugs and medicines and medical appliances	491 18
Beer, wine and spirits	68 00
Bedding, napery and general house furnishings	673 08
Brooms, brushes, mops, soap and cleaning appliances	47 25
Fuel	476 73
Light—gas, oil and candles	168 42
Water	40 00
Hay and straw	
Clothing for patients, including boots and shoes	106 95
Ice supply	45 00
Salaries and wages	275 75
Taxes and insurance	350 00
Contingencies	177 39
Repairs, ordinary	862 14
Total expenditure for maintenance	$5,658 32
Government grant for 1897	$2,199 00

INSPECTIONS.

I visited this Hospital on the 6th January. There were then 17 patients under treatment. Since the 1st October, 87 were admitted and 6 died. The dispensary, operating room, private rooms and public wards were clean and in good order. A room has been fitted up in the attic for diphtheria and scarlet fever cases. Double windows have been put on, fitted with ventilators, making the building very comfortable in all parts of it.

The books were properly entered up.

I inspected this hospital again on the 23rd September, and found 29 patients (11 males and 18 females) in residence. The admissions during the year were 335, and the deaths 14.

The private rooms, and public wards, and other departments, were in satisfactory order. The books were entered up.

THE BROCKVILLE GENERAL HOSPITAL.

The following summaries show the operations of this Hospital during the official year:

Number under treatment, on the 30th September, 1896	26	
Number admitted	392	
Number of births	10	
Total number under treatment		428
Discharged	380	
Died	18	
Remaining under treatment, on the 30th September, 1897	30	
		428

Places Admitted From.

From the Town of Brockville	262	
From the Counties of Leeds and Grenville	107	
From other counties in the province	30	
From the United States	29	
Other countries	..	
		428

Sex.

Male	160	
Female	268	
		428

Nationalities.

Canadian	362	
English	14	
Irish	10	
Scotch	11	
United States	31	
Other countries	..	
		428

Religious Denominations.

Protestant	412	
Roman Catholic	16	
Other religions, or not known	..	
		428

The following table gives a summary of certain diseases treated in the Brockville General Hospital during the year.

	No. of cases treated.
Typhoid fever	24
Typhus	2
Puerperal	..
Cerebro spinal fever	..
Diphtheria	2
Smallpox	..

Revenue.

From the Province of Ontario	$2,119 48
From the Town of Brockville	300 00
From the Counties of Leeds and Grenville	300 00
From paying patients	4,063 54
From property belonging to the Hospital	258 68
From subscriptions, bequests and donations of private individuals	809 36
From other sources not enumerated	883 18
Total	$8,734 24

Expenditures.

Butchers' meat	$ 537 76
Butter	374 22
Flour, bread and meal	207 30
Milk	270 70
Tea and coffee	95 78
Potatoes and other vegetables	121 84
Groceries and provisions, not enumerated	592 55
Drugs and medicines	800 12
Medical and surgical appliances	254 17
Beer, wine and spirits	48 00
Bedding, napery and general house furnishings	446 32
Brooms, brushes. mops, soap and cleaning appliances	68 67
Fuel	1,085 89
Light—gas, oil and candles	213 51
Water supply	37 50
Hay and straw	.....
Clothing for patients, including boots and shoes	.....
Ice supply	40 00
Salaries and wages	2,083 38
Taxes and insurance	83 99
Coffins and funerals	.....
Contingencies	141 86
Repairs, ordinary	436 66
Total	$7,940 22

Government grant for 1897	$2,252 89

INSPECTIONS.

I inspected the General Hospital, Brockville, on the 6th January, and found 28 patients in residence—13 males and 15 females. The admissions since the 1st October were 100, and the deaths 5.

The new wing adds much to the convenience and accommodation of the Hospital; and the elevator is a great benefit in moving patients from one flat to another. The building is well heated and lighted. The ventilation and drainage are good, and the water supply is from the town water works All departments of the Hospital were found to be in excellent order. There is good medical attendance and nursing. Books well kept.

My second inspection of the Hospital was made on the 23rd September. There were 27 patients on that day—12 males and 15 females. Since the 1st October, 1896, the admissions numbered 386; the deaths, 17.

All departments were clean and in good order, and the records properly written up.

GENERAL AND MARINE HOSPITAL, COLLINGWOOD.

The following summaries show the operations of the Hospital during the official year :

Movements of Patients.

Under treatment, 15th October, 1896	5	
Admitted	59	
Number of births in the Institution during the year		
Total number under treatment		64
Discharged	58	
Died	2	
Under treatment, 30th September 1897	4	
		64

Places Received From.

From the Town of Collingwood	38	
From the County of Simcoe	11	
From other counties in the Province	15	
From United States		
From other countries		
		64

Sex.

Male	29	
Female	35	
		64

Nationalities

Canadian	42	
English	9	
Irish	5	
Scotch	4	
United States	4	
		64

Religious Denominations.

Protestant	58	
Roman Catholic	6	
Other religions		
		4

The following table gives a summary of certain cases treated in the General and Marine Hospital, Collingwood, during the year

	No. of cases treated.
Typhoid fever	....
Typhus	....
Puerperal	....
Cerebro spinal fever	....
Diphtheria	....
Smallpox	....

Revenue.

Received from the Province of Ontario	$ 559 70
From the Town of Collingwood	140 00
From the County of Simcoe	140 00
From paying patients	624 28
Subscriptions, donations, etc.	414 28
From sources not enumerated	.....
Total	$1,878 26

Expenditures.

Butchers' meat	$ 91 70
Butter	61 67
Flour, bread and meal	67 53
Milk	21 80
Tea and coffee	5 15
Potatoes and other vegetables	13 05
Groceries and provisions not enumerated	134 44
Drugs and medicines	151 53
Surgical appliances	35 00
Beer, wine and spirits	19 70
Bedding, napery and general house furnishings	57 16
Brooms, brushes, mops, etc.	16 36
Fuel	493 16
Light—gas, oil and candles	67 79
Water supply	14 83
Hay and straw	18 24
Clothing	.....
Ice	6 75
Salaries and wages	605 35
Taxes and insurance	160 89
Contingencies	.....
Repairs, ordinary	22 15
Interest and rent	.....
Total	$2,064 25

Government grant for 1897	$ 471 41

INSPECTIONS.

I made an inspection of the General and Marine Hospital, Collingwood, on the 26th June, and found it in good order throughout. The public wards and private rooms, operating room, dispensary, bath-rooms, water-closets, etc., were all clean and tidy. There is good heating, lighting and ventilation.

The new addition to the hospital is a great improvement, affording increased room for patients and convenience in management.

There were five patients in residence on this date, viz., one male and four females. The admisions since the 1st October were forty-nine, and the deaths two.

The books were properly entered up.

THE NICHOLS HOSPITAL, PETERBOROUGH.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896.	24	
Admitted	244	
Births in Hospital	1	
Total number under treatment	——	269
Discharged	236	
Died	15	
Under treatment, 30th September, 1897	18	
	———	269

Places Received From.

From the Town of Peterborough	192	
From the County of Peterborough	46	
From other counties of the Province	31	
From the United States	..	
From other countries	...	
	——	269

Sex.

Male	142	
Female	127	
	——	269

Religious Denominations.

Protestant	260	
Roman Catholic	8	
Other religions (or not known)	1	
	——	269

Nationalities.

Canadian	193	
English	44	
Irish	10	
Scotch	8	
United States	14	
Other countries	..	
	——	269

The following table gives a summary of certain cases treated in the Nichols Hospital, Peterborough, during the year:

	No. of cases treated
Typhoid fever	31
Typhus fever	..
Puerperal fever	..
Cerebro spinal fever	..
Diphtheria	15
Smallpox	..

Revenue.

From the Province	$2,335 77
From the Town of Peterborough	.....
From patients themselves for maintenance and treatment	1,221 77
From property belonging to the Hospital, endowments, etc.	4,072 00
From subscriptions, donations and bequests from private individuals	.....
From other sources	.....
Total	$7,629 54

Expenditure.

Butchers' meat	$492 10
Butter	349 95
Flour, bread and meal	285 08
Milk	142 40
Tea and coffee	42 80
Potatoes and other vegetables	276 03
Groceries and provisions, not enumerated	357 89
Drugs and medicines	853 51
Surgical instruments and appliances	150 20
Beer, wine and spirits	98 75
Bedding, napery and general house furnishings	655 39
Brooms, brushes, mops, soap and cleaning appliances	.....
Fuel	686 38
Light—gas, oil and candles	405 58
Water supply	149 73
Clothing for patients	108 52
Ice	34 40
Salaries and wages	2,554 25
Taxes and insurance	40 00
Hay and straw	.....
Contingencies	251 02
Repairs, ordinary	949 39
Advertising, printing, stationery, postage, etc.	.....
Total	$8,883 37

Government grant for 1897 .... $1,769 43

INSPECTIONS.

This Hospital was inspected by me on the 8th January, when there were 29 patients in the wards—18 males and 11 females. Since the 1st October 64 had been admitted, and 2 had died.

The hospital premises were in good order, and the different departments such as the office, dispensary, operating room, private rooms and public wards, dining rooms, wash and bath-room and water-closets were in well kept condition. The infectious department is in a separate building.

A good staff of doctors and nurses in attendance. The books were found to be properly entered up.

I instructed Mr. Mann to inspect this Hospital. A copy of his report is annexed:

This Hospital was inspected by me on 25th August, 1897, and was found to be in its usual satisfactory state.

There were 9 males and 11 females undergoing treatment at the time of my visit.

Some repairs are being made to the water supply.

New iron bedstead and mattresses have been procured for the Nurses and Servants Departments. The interior of the Hospital has been painted this summer.

Books were entered up and properly kept.

ST. JOSEPH'S HOSPITAL, PETERBOROUGH.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients

Number under treatment, 1st October, 1896	18	
Admitted	203	
Births in hospital	..	
Total number under treatment		221
Discharged	195	
Died	13	
Under treatment, 30th September, 1897	13	
		221

Places Received From.

From the Town of Peterborough	78	
From the County of Peterborough	78	
From other counties of the Province	64	
From the United States	1	
From other countries	..	
		221

Sex.

Male	104	
Female	117	
		221

Religious Denominations.

Protestant	23	
Roman Catholic	198	
		221

Nationalities.

Canadian	142	
English	4	
Irish	45	
Scotch	1	
United States	..	
Other countries	29	
		221

The following gives a summary of certain cases treated in the St. Joseph Hospital, Peterborough, during the year:

	No. of cases treated.
Typhoid fever	..
Typhus fever	..
Puerperal fever	..
Cerebro spinal fever	..
Diphtheria	22
Smallpox	..

Revenue.

From the Province	$ 846 00
From the Town of Peterborough	23 00
From patients themselves for maintenance and treatment	678 70
From property belonging to the Hospital	.....
From subscriptions, donations and bequests from private individuals	295 00
From all other sources	1,278 60
Total	$3,121 30

Expenditure.

Butchers' meat	$149 50
Butter	105 73
Flour, bread and meal	148 75
Milk	35 10
Tea and coffee	65 10
Potatoes and other vegetables	60 15
Groceries and provisions, not enumerated	50 35
Drugs and medicines	325 42
Surgicial instruments and appliances	92 45
Beer, wine and spirits	107 46
Bedding, napery and general house furnishings	171 56
Brooms, brushes, mops, soap and cleaning appliances	61 50
Fuel	664 93
Light—gas, oil and candles	44 16
Hay and straw	45 95
Clothing for patients	30 00
Ice	25 00
Salaries and wages	360 00
Taxes and insurance	.....
Coffins and funerals	90 00
Contingencies	290 47
Repairs, ordinary	875 00
Total	$3,798 58
Government grant for 1897	$1,295 46

INSPECTIONS.

I inspected this Hospital on the 8th January. There were then 13 patients in residence—9 men and 4 women. Admitted since the commencement of the year, 58; deaths, 4.

The dispensary, operating-room, sitting-room, dining-room, office, kitchen, public wards and private rooms were all in good order.

Good ventilation, lighting, heating and drainage. There is a good medical staff and efficient nursing. Books well kept.

I Instructed Mr. Mann to make a second inspection of this Hospital. A copy of his report is annexed:

The above named institution was inspected by me on the 25th August, 1897, as instructed by you.

On this occasion there were 14 patients undergoing treatment, 5 males and 9 females.

There is no change to note here.

Building was in good state of repair and the books properly kept.

HOTEL DIEU HOSPITAL, WINDSOR.

The following summaries show the operations of this Hospital during the official year :

Movements of Patients.

Number under treatment, 1st October, 1896	13	
Admitted	234	
Total number under treatment	——	247
Discharged	210	
Died	13	
Under treatment, 30th September, 1897	24	
	——	247

Places Received From.

From the Town of Windsor	115	
From the County of Essex	84	
From other counties of the Province	9	
From United States	32	
From other countries	7	
	——	247

Sex.

Male	96	
Female	151	
	——	247

Nationalities.

Canadian	174	
English	22	
Irish	19	
Scotch	....	
United States	21	
Other countries	11	
	——	247

Religious Denominations.

Protestant	62	
Roman Catholic	185	
	——	247

The following table gives a summary of certain diseases treated in the Hotel Dieu Hospital, Windsor, during the year :

	No. of cases treated.
Typhoid fever	7
Typhus fever	....
Puerperal fever	....
Cerebro spinal fever	....

Diphtheria	
Smallpox	

Revenue.

From the Province of Ontario	$1,708 82
From the Town of Windsor	194 30
From the County of Essex	157 47
From patients themselves for maintenance and treatment	1,700 00
Subscriptions, donations and bequests	425 51
From other sources not enumerated	1,712 01
Total	$5,898 11

Expenditures.

Butchers' meat	$331 07
Butter	111 96
Flour, bread and meal	165 64
Milk	274 00
Tea and coffee	33 95
Potatoes and other vegetables	109 82
Groceries and provisions not enumerated	187 65
Drugs and medicines	264 76
Medical and surgical appliances	78 91
Surgical instruments	2 20
Beer, Wine and spirits	37 00
Bedding, napery and general housefurnishings	179 93
Brooms, brushes, mops, soap and cleaning appliances	128 98
Fuel	194 55
Light—gas, oil and candles	31 99
Water supply	15 30
Hay and straw	123 53
Clothing for patients, including boots and shoes	8 97
Ice	20 00
Salaries and wages	74 56
Taxes and insurance	147 36
Contingencies	50 13
Repairs ordinary	143 48
Total	$2,715 74
Government grant for 1897	$1,428 38

INSPECTIONS.

There were eighteen patients (four men and fourteen women) in this Hospital when I inspected it on 16th April. The number received for treatment since the 1st October was 129, and the deaths five.

The institution was in good order throughout. The grounds are being improved, new fencing, painting, and entrance way to building being added.

Mr. Nicholson was instructed to make a second inspection of this Hospital. He reported as follows:

I made an inspection of this Hospital on the 17th August. There were then under treatment six men and eight women. During the year 200 patients have been admitted, and eleven have died. All the apartments were clean and neat in appearance, and well ventilated.

The building is heated by hot water, natural gas is used as fuel.

The front entrance has been improved, namely, new walk, fence and iron steps have been provided.

The books are properly kept.

ST. JOSEPH'S HOSPITAL, CHATHAM.

The following summaries show the operations of this Hospital during the official year :

Movements of Patients.

Number under treatment, 1st October, 1896	15	
Admitted	262	
Births in Hospital	2	
Total number under treatment		279
Discharged	230	
Died	21	
Under treatment, 30th September, 1897	28	
		279

Places Received From.

From the Town of Chatham	153	
From the County of Kent	89	
From other counties of the Province	33	
From the United States	4	
From other countries	....	
		279

Sex.

Male	120	
Female	159	
		279

Religious Denominations.

Protestant	159	
Roman Catholic	120	
		279

Nationalities.

Canadian	236	
English	14	
Irish	12	
Scotch	....	
United States	10	
Other countries	7	
		279

The following tables gives a summary of certain cases treated in the St. Joseph's Hospital, Chatham, during the year:

Typhoid fever	29
Typhus "	....
Puerperal "	1
Cerebro spinal fever	....
Diphtheria	9
Smallpox	....

Revenue.

From the Province of Ontario	$1,243 16
From the Town of Chatham	80 39
From the County of Kent	....
From patients for maintenance and treatment	2,334 00
From subscriptions, donations and bequests from private individuals	300 00
From other sources	....
	$3,957 55

Expenditures.

Butcher's meat	$407 00
Butter	135 50
Flour, bread and meal	177 35
Milk	207 00
Tea and coffee	117 00
Potatoes and other vegetables	55 00
Groceries and provisions, not enumerated	421 17
Drugs and medicines	97 65
Medical and surgical appliances	79 00
Beer, wine and spirits	57 75
Bedding, napery and general house furnishings	103 50
Brooms, brushes, mops, soap and cleaning appliances	67 75
Fuel	410 00
Light—gas, oil and candles	125 00
Water	10 00
Hay and straw	....
Clothing for patients	....
Ice supply	11 77
Salaries and wages	525 00
Taxes and insurance	90 00
Contingencies	67 00
Coffins and funerals	9 00
Repairs, ordinary	97 00
Total	$3,270 44
Government grant for 1897	$1,290 21

INSPECTIONS.

I made an inspection of the St. Joseph's Hospital, Chatham, on the 15th April, and found it in good order throughout. There were 14 patients in residence—4 men and 10 women—and since the 1st October 133 patients had been admitted, and 9 had died.

There is a good medical staff in attendance and good nursing.

I found the books properly kept.

I inspected the Hospital again on the 11th September, and found all the rooms, public and private, in well kept order, and the building well lighted, heated and ventilated.

There were 8 males and 14 females under treatment on this occasion. Since the 1st of October, 1896, the admissions numbered 238, and the deaths 19. Books properly kept.

GENERAL HOSPITAL, STRATFORD.

The following summaries show the operations of the Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	19	
Admitted	175	
Number of births during the year	11	
Total number under treatment		205
Discharged	169	
Died	13	
Under treatment, 30th September, 1897	23	
		205

Places Received From.

From the City of Stratford	130	
From the County of Perth	47	
From other counties in the Province	20	
From the United States	5	
From other countries	3	
		205

Sex.

Male	104	
Female	101	
		205

Nationalities.

Canadian	133	
English	20	
Irish	23	
Scotch	11	
United States	10	
Other countries	8	
		205

Religious Denominations.

Protestant	171	
Roman Catholic	31	
Other religions	3	
		205

The following table gives a summary of certain diseases treated in the General Hospital, Stratford, during the year:

	No. of cases treated.
Typhoid fever	20
Typhus fever	....
Puerperal fever	....
Cerebro spinal fever	....
Diphtheria	....
Smallpox	....

Revenue.

Received from the Province of Ontario	$1,644 79
From the City of Stratford	1,000 00
From the County of Perth	500 00
From paying patients	2,087 47
Subscriptions, donations, etc	1,526 00
From sources not enumerated	752 72
Total	$7,510 98

Expenditures.

Butcher's meat	$ 386 79
Butter	176 96
Flour, bread and meal	211 17
Milk	78 10
Tea and coffee	91 42
Potatoes and other vegetables	110 64
Groceries and provisions not enumerated	490 79
Drugs and medicines	411 61
Surgical instruments and appliances	2 49 43
Beer, wine and spirits	66 60
Bedding, napery and general house furnishings	74 32
Brooms, brushes, mops, etc.	73 20
Fuel	702 60
Light—gas, oil and candles	232 40
Water supply	50 00
Hay and straw	39 96
Clothing	.....
Ice	15 00
Salaries and wages	1,783 50
Taxes and Insurance	33 75
Contingencies	476 69
Repairs, ordinary	256 42
Total	$6,011 35
Government grant for 1897	$1,481 73

INSPECTIONS.

My first inspection of this Hospital for the year, was made, on the 12th January. Twenty-four patients were under treatment on that day, viz., thirteen men, eight women and three children.

The private rooms and public wards, dispensary and operating room, bath-rooms and water closets were in commendable order.

The kitchen, laundry and servants' apartments are in the third storey, the lower flats being entirely devoted to accommodation for patients. There is a good staff of physicians and nurses. The grounds and outbuildings were in good order. The records were well kept.

I instructed Mr. Mann to inspect this Hospital. A copy of his report is annexed:

The General Hospital was visited by me according to your instructions on the 15th Sept., 1897. There were nineteen patients undergoing treatment on this occasion who were progressing generally favorably.

The buildings were in a good state of repair, and have been greatly improved by the addition of a new laundry, and a new lavatory has also been constructed in connection with operating room. Painting has been done generally inside and out. There have been several minor improvements also carried out.

There are employed in this Institution a superintendent and seven nurses.

Books were properly kept and entered up.

AMASA WOOD HOSPITAL, ST. THOMAS.

The following summaries shew the operations of this Hospital during the official year :

Movements of Patients.

Number under treatment, 1st October, 1896	9	
Admitted	122	
Births in the Hospital	9	
Total number under treatment		140
Discharged	120	
Died	11	
Under treatment, 30th September, 1897	9	
		140

Places Received From.

From the City of St. Thomas	108	
From the County of Elgin	28	
From other counties in the Province	4	
From the United States	....	
From other countries	....	
		140

Sex.

Male	74	
Female	66	
		140

Nationalities.

Canadian	86	
English	27	
Irish	12	
Scotch	5	
United States	8	
Other countries	2	
		140

Religious Denominations.

Protestant	130	
Roman Catholic	10	
Other religions	....	
		140

The following table gives a summary of certain diseases treated during the year :

	No. of cases treated.
Typhoid fever	5
Typhus "	..
Puerperal "	..
Cerebro spinal fever	..
Diphtheria	..
Smallpox	..

Revenue.

From the Province of Ontario	$ 661 91
From the City of St. Thomas	1,500 00
From the County of Elgin	..
From property belonging to Hospital	40 00
From other municipalities in the Province	..
From paying patients themselves	1 201 85
Other sources	50 00
Total	$3,453 76

Expenditures.

Butchers' meat	$ 360 18
Butter	121 87
Flour, bread and meal	88 29
Milk	169 11
Tea and coffee	42 14
Potatoes and other vegetables	77 37
Groceries and other provisions not enumerated	363 28
Drugs and medicines	152 05
Surgical instruments and appliances	173 28
Beer, wine and spirits	20 55
Bedding, etc.	291 98
Brooms, brushes, mops, soap and cleansing appliances.	24 46
Fuel	404 30
Light—gas, oil and candles	172 27
Water supply	5 20
Clothing for patients, including boots and shoes	..
Ice	21 10
Salaries and wages	1,285 50
Taxes and insurance	..
Coffins and funerals	..
Contingencies	88 22
Repairs, ordinary	4 05
Total	$3,865 20

Government grant for 1897 $593 59

INSPECTIONS.

I made an inspection of this Hospital on the 23rd May, when there were 10 patients in residence. Admitted since the 1st October, 86; deaths, 7.

The private rooms and public wards, dispensary, operating-room, dining-room, kitchen, nurses' department, etc., were all clean and in good order. Books properly kept.

I instructed Mr. Nicholson to make a second inspection of this Hospital. A copy of his report is annexed.

According to instructions, I visited this Hospital on the 19th August. The patients then under treatment were 2 men, 3 women and a boy under twelve years of age. The Hospital contains twenty-two beds.

All the public and private rooms were in good order.

The staff consists of a Matron and five nurses.

The city doctors attend at the Hospital in rotation, two continuing for two months at a time. The records were entered up.

GENERAL AND MARINE HOSPITAL, OWEN SOUND.

The following summaries show the operations of this Hospital during the official year.

Movements of Patients.

Number under treatment, 1st October, 1896	9	
Admitted	91	
Births in Hospital	2	
Total number under treatment		102
Discharged	78	
Died	8	
Under treatment, 30th September, 1897	16	
		102

Places Admitted From.

From the Town of Owen Sound	57	
From the County of Grey	33	
From other counties in the Province and sailors	11	
From the United States	1	
From other countries	..	
		102

Sex.

Male	59	
Female	43	
		102

Nationalities.

Canadian	96	
English	3	
Irish	1	
Scotch	1	
United States	1	
Other countries	..	
		102

Religious Denominations.

Protestant	96	
Roman Catholic	6	
Other religions, or not known	..	
		02

The following table gives a summary of certain diseases treated in the General and Marine Hospital during the year:

	No. of cases treated
Typhoid fever	15
Typhus "	....
Puerperal "	....
Cerebro spinal fever	....
Diphtheria	....
Smallpox	.....

Revenue.

From the Province of Ontario	$767 75
From the Dominion Government	.... ..
From the Town of Owen Sound	585 42
From the County of Grey	200 00
From other municipalities	170 00
From patients themselves for maintenance and treatment	528 90
From endowments, investments or other property belonging to the Hospital	.... ..
From subscriptions, bequests and donations of private persons	245 45
From all other sources not enumerated	456 53
	$2,954 09

Expenditures.

Butcher's meat	$134 25
Butter	94 38
Flour, bread and meal	110 72
Milk	.... ..
Tea and coffee	17 20
Potatoes and other vegetables	12 19
Groceries and provisions, not enumerated	220 74
Drugs and medicines	60 21
Medical and surgical appliances	79 20
Surgical instruments	.. .. ..
Beer, wine and spirits	17 50
Bedding, napery and general house furnishings	140 55
Brooms, brushes, mops, soap and cleaning appliances	12 60
Fuel	200 60
Light—oil and candles	30 31
Water supply	97 92
Hay and straw	19 49
Clothing for patients	.... ..
Ice	19 00
Salaries and wages	728 26
Insurance and interest	300 00
Contingencies	26 47
Stationary, advertising, printing, postage, etc.	.... ..
Repairs, ordinary	6 16
Total	$2,327 75
Government grant for 1897	$611 20

INSPECTIONS.

The General and Marine Hospital, Owen Sound, was inspected by me on the 26th June. The private rooms, public wards, operating room, sitting room, dining room, wash and bath room, water-closets, etc., were in their usual condition of good order.

Nine patients, five males and four females, were under treatment on this date. Books properly kept.

I inspected this Hospital on the 1st October and found all its departments clean and in good order. There were 17 patients in the wards on that day, namely, 10 males and 7 females.

Since the 1st October, 1896, the admissions were 93; and the deaths 7 The Hospital is well provided for as regards medical attendance and nursing.

HOSPITAL FOR SICK CHILDREN, OTTAWA.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st October, 1896	6	
Admitted	67	
Total number under treatment		73
Discharged	62	
Died	3	
Under treatment, 30th September, 1897	8	
		73

Places Received From.

From the City of Ottawa	61	
From the County of Carleton	.....	
From other counties in the Province of Ontario	10	
From the United States	1	
From other countries	1	
		73

Sex.

Male	33	
Female	40	
		73

Nationalities.

Canadian	65	
English	5	
Irish	....	
Scotch	....	
United States	....	
Other countries	3	
		73

Religious Denominations.

Protestant	60	
Roman Catholic	13	
Other religions, Lutheran and Jewish	....	
		73

The following table gives a summary of certain diseases treated in the Hospital for Sick Children, Ottawa, during the year:

	No. of cases treated
Typhoid fever	14
Typhus	....
Puerperal	1
Cerebro spinal fever	....
Diptheria	....
Smallpox	...

Revenue.

From the Province of Ontario	$ 723 99
From the City of Ottawa	....
From the County of Carleton	50 00
From other municipalities	.....
From patients themselves for maintenance and treatment	2,267 80
Income from endowments	.....
Subscriptions, donations and bequests of private individuals	1,204 60
From other sources not enumerated	656 23
Total	$4,902 62

Expenditures.

Butcher's meat	$ 250 64
Butter	137 51
Flour, bread and meal	126 71
Milk	250 45
Tea and coffee	26 48
Potatoes and other vegetables	32 10
Groceries and provisions not enumerated	537 00
Drugs and medicines	188 39
Medical and surgical appliances	71 49
Surgical instruments	.....
Beer, wine and spirits	.....
Bedding, napery and general house furnishings	54 86
Brooms, brushes, mops, soap and cleaning appliances	20 18
Fuel	374 54
Light—gas, oil and candles	181 46
Water supply	12 00
Ice	16 50
Clothing for patients, including boots and shoes	.....
Salaries and wages	1,917 10
Taxes, insurance	35 18
Coffins and funerals	.....
Contingencies	510 29
Repairs, ordinary	90 06
Total	$4,832 94

Government grant for 1897 ..... $805 14

INSPECTIONS.

I visited this Hospital on the 25th January. There were eleven children under treatment on that day. Since the 1st of the year twenty three have been admitted and one has died.

I found no change in the building since my last visit : all departments were clean and in good order.

The Hospital is partly used for adult patients all of whom pay their way.

This Hospital was inspected by me on the 21st September.

There were then under treatment twelve children (four boys and eight girls.)

Since the 1st October sixty-seven have been admitted and three had died.

All the rooms, beds, bedding, bath-rooms, water-closets, etc., were clean and in good order;

The Hospital is also well provided for in nursing and medical attendance.

GENERAL HOSPITAL, CHATHAM.

The following summaries show the operations of this Hospital during the official year :

Movements of Patients.

Number under treatment, 1st October, 1896	19	
Admitted	201	
Births in Hospital	12	
Total number under treatment		232
Discharged	202	
Died	11	
Under treatment, 30th September, 1896	19	
		232

Places Received From.

From the Town of Chatham	78	
From the County of Kent	111	
From other counties of the Province	18	
From the United States	25	
From other countries	....	
		232

Sex.

Male	104	
Female	128	
		232

Religious Denominations.

Protestant	218	
Roman Catholic	14	
		232

Nationalities.

Canadian	76	
English	10	
Irish	12	
Scotch	9	
United States	25	
Other countries	....	
		232

The following gives a summary of certain cases treated in the Chatham Hospital during the year:

	No. of cases treated.
Typhoid fever	20
Typhus fever	....
Puerperal fever	....
Cerebro spinal fever	....
Diphtheria	5
Smallpox	....

Revenue.

From the Province	$1,363 58
From the Town of Chatham	147 50
From the County of Kent	45 00
From patients themselves for maintenance and treatment	2,078 90
From property belonging to the Hospital	.....
From subscriptions, donations and bequests from private individuals	468 43
From all other sources	.....
Total	$4,103 41

Expenditure.

Butchers' meat	$254 71
Butter	90 00
Flour, bread and milk	96 30
Milk	135 00
Tea and coffee	36 75
Potatoes and other vegetables	71 13
Groceries and provisions, not enumerated	307 11
Drugs and medicines	117 54
Surgical instruments and appliances	6 83
Beer, wine and spirits	10 75
Bedding, napery and general house furnishings	260 07
Brooms, brushes, mops, soap and cleaning appliances	27 42
Fuel	248 90
Light—gas, oil and candles	132 60
Water supply	4 40
Clothing for patients	.....
Ice	15 00
Salaries and wages	965 00
Taxes and insurance	14 10
Coffins and funerals	.....
Contingencies	108 68
Repairs, ordinary	40 00
Total	$2,942 29

Government grant for 1897 $1,067 86

INSPECTIONS.

I made an inspection of the General Hospital, Chatham, on the 15th April. It contained 6 patients—1 male and 5 females, on that date. The number treated since the 1st October, 1896, was 97, and the deaths 5.

The private rooms, public wards, operating room, dispensary, bath-rooms and water closets were all clean and in good order.

The books were properly entered up.

I inspected this Hospital on the 11th September. During the past year a very neat building has been erected, as a home for the nurses; also a building for contagious diseases, both of which are on the Hospital grounds.

There were 14 patients under treatment on this date—6 males and 8 females. The admissions since the 1st October last, were 182; deaths, 8; births, 12.

GENERAL HOSPITAL SUDBURY.

The following summaries show the operations of this Hospital during the official year:

Number under treatment on the 1st October, 1896	8	
Number admitted	97	
Number of births	1	
Total number under treatment		106
Discharged	96	
Died	7	
Remaining under treatment on the 30th September, 1897	3	
		106

Places Admitted From.

From the Town of Sudbury	16	
From the Districts of Nipissing and Algoma	89	
From other counties in the Province	..	
From the United States	1	
Other countries	..	
		106

Sex.

Male	102	
Female	4	
		106

Nationalities.

Canadian	84	
English	8	
Irish	1	
Scotch	2	
United States	3	
Other Countries	8	
		106

Religious Denominations.

Protestant	69	
Roman Catholic	36	
Other religions, or not known	1	
		106

The following table gives a summary of certain diseases treated in the Sudbury General Hospital during the year:

	No. of cases treated
Typhoid fever	3
Typhus "	..
Puerperal "	..
Cerebro Spinal fever	..
Diphtheria	..
Smallpox	..

Revenue.

From the Province of Ontario	$1,044 01
From the Town of Sudbury	.....
From the District of Nipissing, etc.	.....
From paying patients	1,321 85
From property belonging to the Hospital	.....
From subscriptions, bequests, and donations of private individuals	761 00
From other sources, not enumerated	.....
Total	$3,126 86

Expennitures.

Butchers' meat	$224 32
Butter	131 00
Flour, bread and meal	126 00
Milk	196 50
Tea and coffee	78 00
Potatoes and other vegetables	146 55
Groceries and provisions, not enumerated	268 00
Drugs and medicines	150 00
Medical and surgical appliances	39 90
Beer, wine and spirits	42 25
Bedding, napery and general housefurnishings	112 25
Brooms, brushes, mops, soap and cleaning appliances	36 50
Fuel	275 00
Light, gas, oil and candles	90 00
Water supply	30 00
Hay and straw	25 00
Clothing for patients, including boots and shoes	5 00
Ice supply	17 75
Salaries and wages	1,030 50
Taxes and insurance	35 40
Coffins and funerals	15 00
Contingencies	25 00
Repairs, ordinary	10 00
Total	$3,109 92

Government grant for 1897 ..... $589 17

INSPECTIONS.

I made an inspection of the General Hospital, Sudbury, on the 2nd June There were then six patients in residence; and since the 1st October, 1896, seventy-eight were admitted, and five died.

The private rooms and public wards, beds and bedding, office, kitchen, cellar etc., were in well kept order. Good drainage and ventilation.

Electric light used. Bath-rooms and water-closets on each flat.

Books properly kept.

I inspected this Hospital on the 30th October. There were then seven male patients under treatment. All the rooms, beds and bedding, bath-rooms, water-closets, etc., were in clean and neat order.

The building is supplied with electric light and town water, good ventilation and drainage.

GENERAL HOSPITAL, HUNTSVILLE.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment from 1st October, 1896	10	
Admitted	92	
Number of births	5	
Total number under treatment		107
Discharged	105	
Died		
Under treatment 30th September, 1897	2	
		107

Places Received From.

From the Village of Huntsville		
From the District of Muskoka and Parry Sound	67	
From other counties in the Province	36	
United States and other countries	4	
		107

Sex.

Male	93	
Female	14	
		107

Nationalities.

Canadian	88	
English	10	
Irish	4	
Scotch	1	
United States	2	
Other countries	2	
		107

Religious Denominations.

Protestant	83	
Roman Catholic	23	
Other religions	1	
		107

The following table gives a summary of certain diseases treated in the General Hospital, Huntsville, during the year:

	No. of cases treated.
Typhoid fever	6
Typhus fever	..
Puerperal fever	..
Cerebro spinal fever	..
Diphtheria	1
Smallpox	..

Revenue.

From the Province of Ontario	$344 17
From the Village of Huntsville	.....
From the District of Muskoka	.....
From other municipalities	.....
From patients for maintenance and treatment	133 68
From subscriptions, bequests and donations of private individuals	.....
From all other sources	680 15
Total	$1,158 00

Expenditures.

Butchers' meat	$ 75 00
Butter	60 00
Flour, bread and meal	70 00
Milk	40 00
Tea and coffee	26 00
Potatoes and other vegetables	30 00
Groceries and provisions not enumerated	80 00
Drugs, medicines and surgical instruments	171 00
Beer, wine and spirits	25 00
Bedding, napery and general house furnishings	26 00
Brooms, brushes, etc.	15 00
Fuel	80 00
Light—gas, oil and candles	40 00
Water supply	.....
Hay and straw	.....
Clothing for patients	.....
Ice	20 00
Salaries and wages	320 00
Taxes and insurance	60 00
Coffins and funerals	.....
Repairs, ordinary	20 00
Contingencies	.....
Total	$1,158 00
Government grant for 1897	$358 63

INSPECTIONS.

An inspection of this hospital was made by me on the 28th May.

All the rooms, beds, bedding, etc., were clean and in good order.

There were no patients in residence on this date.

Bath-rooms and water closets have not been put in as yet; neither has the town water service been extended to the new addition. Well water is used.

The drainage is into the river.

The number of patients admitted since the 1st October was 76, no deaths. There is good medical attendance and nursing.

I inspected this hospital on 29th October, and found no change in the building or grounds since my last visit. Bath-rooms and water-closets have not yet been fitted up in the new building, and the basement is not finished. There were five male patients under treatment on this date, and 103 patients had been received during the past year.

THE WOODSTOCK HOSPITAL.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, from 1st October, 1896	20	
Admitted	109	
Births	1	
Total number under treatment		130
Discharged	108	
Died	14	
Under treatment, 30th September, 1897	8	
		130

Places Admitted From.

From the Town of Woodstock	52	
From the County of Oxford	57	
From other counties in the Province	18	
From the United States	3	
From other countries	..	
		130

Sex.

Male	63	
Female	67	
		130

Nationalities.

Canadian	95	
English	25	
Irish	4	
Scotch	3	
United States	1	
Other countries	2	
		130

Religious Denominations.

Protestant	123	
Roman Catholic	5	
Other religions	2	
		130

The following table gives a summary of certain diseases treated in the Woodstock Hospital during the year:

	No. of cases treated.
Typhoid fever	31
Typhus "	..
Puerperal "	..
Cerebro Spinal fever	..
Diphtheria	..
Smallpox	..

Revenue.

From the Province of Ontario	$ 734 45
From the Town of Woodstock	300 00
From the municipalities in the Province	300 00
From paying patients themselves	2,475 23
Subscriptions, donations and bequests in cash	237 00
Income from endowments, etc., or other property belonging to the Hospital	.....
Received from other sources	70 85
Total	$4,117 53

Expenditures.

Butcher's meat	$ 237 42
Butter	74 29
Flour, bread and meal	98 62
Milk	184 00
Tea and coffee	67 15
Potatoes and other vegetables	7 54
Groceries and other provisions not enumerated	273 02
Drugs and medicines	231 92
Surgical appliances	114 91
Beer, wine and spirits	36 40
Bedding, etc	62 61
Brooms, brushes, mops, soap and cleaning appliances	56 59
Fuel	462 17
Light—gas, oil and candles	182 75
Water supply	.....
Hay and straw	.....
Clothing for patients, including boots and shoes	.....
Ice	22 80
Salaries and wages	1,221 00
Taxes and insurance	.....
Coffins and funerals	.....
Contingencies	243 15
Repairs, ordinary	7 50
Total	$3,583 84

Government grant for 1897 ..... $646 71

INSPECTIONS.

This Hospital was inspected by me on the 19th May, when there were five patients under treatment, three males and two females.

The admissions since the 1st October were 66, and the deaths 9.

The private rooms, public ward, operating room, dispensary, bath-rooms, wash-rooms, water-closets. etc., were in well-kept order.

The heating, lighting, and ventilation, are satisfactory.

I made an inspection of this Hospital on the 16th October,

On that date there were nine patients under treatment—seven males and two females. During the past year 111 patients were admitted, and 16 died.

There was no change in the building or grounds since my last inspection. The public and private rooms, wash and bath-rooms, water-closets. dispensary, operating room, kitchen and cellar, were all in well-kept order.

The books were properly entered up.

BERLIN AND WATERLOO HOSPITAL, BERLIN.

The following summaries show the operations of the Hospital during the official year:

Movements of Patients.

Number under treatment from 1st October, 1896	14	
Admitted to 30th September, 1896	100	
Births in Hospital	1	
Total number under treatment		115
Discharged	98	
Died	13	
Under treatment, 30th September, 1897	4	
		115

Places Received From.

From the Town of Berlin and Waterloo	76	
From the County of Waterloo	34	
From other counties of the Province	3	
From the United States	1	
From other countries	1	
		115

Sex.

Male	53	
Female	62	
		115

Religious Denominations.

Protestant	92	
Roman Catholic	23	
		115

Nationalities.

Canadian	72	
English	5	
Irish	1	
Scotch	1	
United States	3	
Other countries	33	
		115

The following table gives a summary of certain cases treated in the Berlin and Waterloo Hospital during the year :

	No. of cases treated.
Typhoid fever	19
Typhus fever	..
Pueperal fever	..
Cerebo spinal fever	.
Diphtheria	..
Smallpox	..

Revenue.

From the Province of Ontario	$ 979 59
From the Town of Berlin	1,000 00
From the County of Waterloo	750 00
From the Town of Waterloo	500 00
From patients for maintenance and treatment	928 82
From subscriptions, donations and bequests from private individuals	2,236 34
From other sources	12 35
Total	$6,407 10

Expenditures.

Butchers' meat	$ 269 51
Butter	69 65
Flour, bread and meal	75 74
Milk	124 67
Tea and coffee	47 46
Potatoes and other vegetables	5 35
Groceries and provisions not enumerated	273 81
Drugs and medicines	161 07
Medical and surgical appliances	54 74
Beer, wine and spirits	3 60
Bedding, napery and general house furnishings	65 42
Brooms, brushes, mops, soap ,and cleaning appliances	33 64
Fuel	530 34
Light—gas, oil and candles	106 78
Water	160 94
Hay and straw	.....
Clothing for patients	49 00
Ice supply	33 00
Salaries and wages	1,156 76
Taxes and insurance	.....
Contingencies	330 33
Coffins and funerals	.....
Repairs, ordinary	127 71
Total	$3,619 52
Government grant for 1897	$ 711 93

INSPECTION.

This Hospital was inspected by me on the 21st May There were then nine patients under treatment, namely, three males and six females. Since the 1st October there were 62 admissions and 7 deaths.

The private rooms and public wards, dispensary, operating room, bath-rooms, wash-rooms, laundry, drying room, kitchen and cellars, were all clean and in good order.

There is good heating, lighting, ventilation and drainage. The grounds were being improved. The books were properly written up.

nspected this hospital again on the 15th September.

The private rooms and public wards, and all other departments were in well-kept order.

The building has good drainage, heating and lighting.

On this occasion there were ten patients (three males and seven females) under treatment.

MATERNITY HOSPITAL, OTTAWA.

The following summaries show the operations of this Hospital during the official year:

Movement of Patients.

Number under treatment from 1st October, 1896	7	
Number of births to 30th September	61	
Total number under treatment	49	
		117
Discharged	110	
Died	4	
Under treatment 30th September, 1897	3	
		117

Places Received From.

From the City of Ottawa	107	
From the Province of Quebec	1	
From other counties in the Province of Ontario	4	
From the United States	..	
From other countries	5	
		117

Sex.

Male	23	
Female	94	
		117

Nationalities.

Canadian	94	
English	9	
Irish	3	
Scotch	5	
United States	5	
Other countries	1	
		117

Religious Denominations.

Protestant	92	
Roman Catholic	25	
Other religions	..	
		117

The following table gives a summary of certain diseases treated in the Maternity Hospital, Ottawa, during the year:

	No of cases treated.
Typhoid Fever	
Typhus "	
Puerperal "	
Cerebro Spinal Fever	
Diphtheria	
Smallpox	

Revenue.

From the Province of Ontario	$ 220 13
From the County of Carleton	50 00
From paying patients themselves	610 66
Income from investments	
From subscriptions and donations	657 52
From other sources	88 52
Total	$1,626 83

Expenditures.

Butchers' meat	$ 99 46
Butter	57 72
Flour, bread and meal	48 60
Milk	53 50
Tea and coffee	11 10
Potatoes and other vegetables	32 35
Groceries and provisions not enumerated	81 18
Drugs and medicines	71 87
Medical and surgical appliances	61 56
Surgical instruments	
Beer, wine and spirits	1 55
Bedding, napery and general house-furnishings	11 14
Brooms, brushes, mops soap and cleaning appliances	21 53
Fuel	274 00
Light—gas, oil and candles	63 50
Water supply	47 36
Hay and straw	
Clothing for patients, including boots and shoes	
Ice	3 50
Salaries and wages	549 59
Taxes and insurance	2 44
Coffins and funerals	
Contingencies	77 77
Repairs, ordinary	28 84
Total	$ 1,598 56

Government grant for 1897 $ 389 19

INSPECTIONS.

I inspected this Hospital on the 26th January, and found four female patients convalescing from confinement. No deaths have occurred since the commencement of the year. Three infants were still born.

The building was in good order, well lighted, ventilated and heated. There is a good staff of medical men and nurses. Books properly kept.

I inspected this Hospital on the 22nd September, when there were only two adult females and one infant in residence. The number admitted since the 1st October, 1896, was 63. All the rooms, beds, and bedding were clean and in good order. There is a good staff of medical men and nurses in attendance. There have been 48 births during the year.

HUNTSVILLE HOSPITAL.

The following summaries show the operations of this Hospital during the official year:

Movement of Patients.

Number under treatment from 1st January, 1896	16	
Admitted	344	
Number of births	....	
	——	360
Discharged	343	
Died	10	
Under treatment, 30th September, 1897	7	
	——	360

Places Received From.

From the Village of Huntsville	....	
From the District of Muskoka and Parry Sound	100	
From other counties in the Province	200	
United States and other countries	60	
	——	360

Sex.

Male	296	
Female	64	
	——	360

Nationalities.

Canadian	127	
English	72	
Irish	64	
Scotch	37	
United States	35	
Other countries	25	
	——	360

Religious Denominations.

Protestant	293	
Roman Catholic	67	
Other religions	....	
	——	360

The following table gives a summary of certain diseases treated in the Huntsville Hospital during the year:

	No. of cases treated.
Typhoid fever	29
Typhus fever	....
Puerperal fever	....
Cerebro-spinal fever	....
Diphtheria	....
Smallpox	....

Revenue.

From the Province of Ontario	.....
From the Village of Huntsville	.....
From the District of Muskoka	.....
From other municipalities	.....
From patients for maintenance and treatment	$1,589 29
From subscriptions, bequests and donations of private individuals	175 00
From all other sources	3,847 06
Total	$5611 35

Expenditures.

Butchers' meat	$ 385 07
Butter	210 47
Flour, bread and meal	86 90
Milk	127 50
Tea and coffee	53 60
Potatoes and other vegetables	139 06
Groceries and provisions not enumerated	630 20
Drugs, medicines and surgical instruments	671 20
Beer, wine and spirits	70 00
Bedding, napery and general house furnishings	104 50
Brooms, brushes, etc	111 50
Fuel	402 00
Light—gas, oil and candles	105 00
Water supply	.....
Hay and straw	7 21
Clothing for patients	10 50
Ice	41 24
Salaries and wages	3,220 00
Taxes and insurance	122 50
Coffins and funerals	.....
Repairs, ordinary	70 26
Contingencies	80 50
Total	$6,649 21
Government grant for 1897	1,364 35

INSPECTIONS.

I made an inspection of this Hospital on the 28th May, and found it in good order in all parts; the beds and bedding also were clean.

The nurses' quarters are in an adjoining building. Well water is used, and pumped to a tank by force pump. Bath-room supplied with hot and cold water. There is good drainage, and the building is lighted by electricity. The books were written up. There were ten patients in residence. Received since the 1st October, 156; deaths, five.

I inspected this Hospital on the 29th October. All the rooms, beds and bedding, etc, were in good order.

On that day there were ten patients in residence—seven men and three women. During the year the admissions numbered 193, and the deaths nine.

There is a good staff of doctors and nurses.

GENERAL HOSPITAL, SARNIA.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 3rd October, 1896	....	
Admitted	167	
Births in Hospital	8	
Total number under treatment	——	175
Discharged	144	
Died	12	
Under treatment, 30th September, 1897	19	
	——	175

Places Received from.

From the Town of Sarnia	102	
From the County of Lambton	39	
From other counties of the Province	23	
From the United States	11	
From other countries	....	
	——	175

Sex.

Male	83	
Female	92	
	——	175

Religious Denominations.

Protestant	164	
Roman Catholic	11	
	——	175

Nationalities.

Canadian	122	
English	17	
Irish	8	
Scotch	15	
United States	11	
Other countries	2	
	——	175

The following gives a summary of certain cases treated in the Hospital during the year:

	No. of cases treated
Typhoid fever	9
Typhus fever	....
Puerperal fever	....
Cerebro spinal fever	....
Diphtheria	....
Smallpox	....

Revenue.

From the Province	....
From the town of Sarnia	.....
From the County of Lambton	250 00
From patients themselves for maintenance and treatment	2,538 34
From property belonging to the Hospital	.....
From subscriptions, donations and bequests from private individuals	.....
From all other sources	.....
Total	$2,788 34

Expenditures.

Butcher's meat	$ 351 97
Butter	150 24
Flour, bread and milk	144 21
Milk	210 04
Tea and coffee	62 90
Potatoes and other vegetables	37 21
Groceries and provisions, not enumerated	398 63
Drugs and medicines	387 26
Surgical instruments and appliances	108 17
Beer, wine and spirits	28 85
Bedding, napery and general house furnishings	179 48
Brooms, brushes, mops, soap and cleaning appliances	9 20
Fuel	792 87
Light—gas, oil, candles	210 21
Water supply	.....
Clothing for patients	.....
Ice	.....
Salaries and wages	1,093 37
Taxes and insurance	108 95
Coffins and funerals	.....
Contingencies	623 85
Repairs, ordinary	7 35
Total	$4,904 76

Government grant for 1897 ..... $1 063 50

INSPECTIONS.

The Board of Trustees of the General Hospital, Sarnia, having made application to have their institution placed upon the list for aid, under the Charity Aid Act, I made an inspection of the Hospital on the 25th November, and beg to report as follows:—

The building is of brick, two stories high, with stone basement and shingle, roof. It has 120 ft. frontage by 59 ft. in depth. It is supplied with electric light gas, and hot water heating. The water supply is from the town water works, and the institution drains are connected with the town system.

The basement contains the furnace room, coal rooms, and an extra heater, or furnace, for hot water, refrigerator room, etc.

One-third of the building is not finished, and will remain so until the accommodation is required. There are no outside buildings. The laundry work is done in town.

There is a fumigating room in the end of basement. No morgue.

The main entrance to the ground floor of the building is in the centre of the west side, and opens into a vestibule and hall. On this flat are the Superintendent's sitting-room, bed-room and office, elevator, linen room, dispensary, wash-basin, sink, emergency room, clothes chute, cupboards, and stairway leading to basement, also sitting-room, private rooms and ward kitchen, bath rooms and water closets.

The plumbing is neatly done, and all exposed to view. There is accommodation for twelve beds on this flat.

The main stairway leads to the first flat above the ground floor.

On this flat is the operating room, which is well furnished with wash-basins, sink, anesthetic instrument room, dressing room, and cupboard, also linen room and private and public rooms. There are small fire-grates in all the rooms, public and private. Gas stoves are used in the ward kitchens. This flat is well ventilated and well finished, and has accommodation for seventeen patients. It is well supplied with bath rooms, wash rooms, water closets and electric bells. The wood-work is pine finished in oil and varnish.

The next flat, or attic, contains the nurses' rooms, servants' rooms, bath rooms, wash rooms and water closets. The elevator runs up to this department.

There is also a sitting-room, dining-room, store-room, and kitchen with good range, hot water boiler attached, pantries, etc.

The public and private rooms are furnished with iron bedsteads and cots, hair mattresses, feather pillows, tables, chairs and bedroom furniture, all new and neatly designed. Every bed is provided with a call-bell, so that the nurses in attendance may be communicated with at any time.

There were seventeen patients in the hospital at the time of my visit, namely, five men and twelve women.

It was opened on the 3rd October, 1896, and the first patient was received on the 5th October. Since that date twenty-eight have been admitted, and two had died.

There is a lady superintendent, two head nurses, and four nurses in training, two servants, cook, housemaid and janitor.

There are two medical men on the staff.

The cost of the building, furniture, etc., up to date is $26,500.

I have the honor to recommend that an Order-in-Council be passed, giving authority for the General Hospital, Sarnia, to be taken as named in Schedule "A." of the Charity Aid Act, and to receive aid accordingly from the 3rd October, 1896.

I visited this hospital again on the 23rd May. It then had fourteen patients—four men, nine women, and one child; and since its opening, 3rd October, 1896 ninety-two patients have been received, and ten died.

The sitting-room, offices, operating room, dispensary, private rooms, public wards, beds and bedding, bath rooms, water closets, etc., were all clean and in good order.

There is a good staff of medical men and nurses. Books properly kept. Management good.

I inspected this hospital on the 13th September. Every department was clean and in good order. It is well lighted, heated and ventilated.

There is a good staff of medical men and nurses.

On the date of this inspection there were eleven patients under treatment—seven males and four females.

Received since the 1st October 150 patients, and eleven died. Books entered up.

WESTERN HOSPITAL, TORONTO.

The following summaries show the operations of this Hospital during the official year:

Movements of Patients.

Number under treatment, 1st January, 1897	11	
Admitted	239	
Births in Hospital	5	
Total number under treatment		255
Discharged	224	
Died	10	
Under treatment 30th September, 1897	21	
		255

Places Received From.

From the City of Toronto	203	
From the County of York	9	
From other counties of the Province	34	
From the United States	4	
From other countries	5	
		255

Sex.

Male	92	
Female	163	
		255

Religious Denominations.

Protestant	227	
Catholic	5	
Other religions	23	
		255

Nationalities.

Canadian	168	
English	57	
Irish	21	
Scotch	1	
United States	4	
Other countries	4	
		255

The following table gives a summary of certain cases treated in the Western Hospital, Toronto, during the year:

	No. of cases treated.
Typhoid fever	8
Typhus fever	....
Puerperal fever	....
Cerebro spinal fever	....
Diphtheria	....
Smallpox	....

Revenue.

From the Province of Ontario	.....
From the City of Toronto	$778 94
From the County of York	.....
From the patients for maintenance and treatment	3,121 83
From subscriptions, donations and bequests from private individuals	333 16
From other sources	158 75
	$4,392 68

Expenditures.

Butcher's meat	$450 62
Butter	119 19
Flour, bread and meal	135 00
Milk	217 53
Tea and coffee	.....
Potatoes and other vegetables	71 72
Groceries and provisions not enumerated	543 08
Drugs and medicines	283 83
Medical and surgical appliances	167 59
Beer, wine and spirits	4 40
Bedding, napery and general house furnishings	485 20
Brooms, brushes, mops, soap and cleaning appliances	167 15
Fuel	.....
Light—gas, oil and candles	97 60
Water	12 56
Hay and straw	.....
Clothing for patients	.....
Ice supply	75
Salaries and wages	898 95
Taxes and insurance	.....
Contingencies	83 48
Coffins and funerals	.....
Repairs ordinary	504 00
Total	$4,248 65
Government grant for 1897	$1,250 [illegible]6

INSPECTIONS.

TORONTO, 18th February, 1897.

SIR,—The management of the Western Hospital, Toronto, having made application to have their institution placed upon the list for aid, under the Charity Aid Act, I beg to report that I visited the Hospital on the 10th April, 1896.

The Hospital has temporary premises at 395 Manning avenue, in the north-west part of the city, comprising two semi-detached brick tenement houses, two storeys in height and a basement. There is accommodation for twenty-five patients, but some of the rooms are not yet furnished.

There is an operating room, office, sitting room, a large public room and some private rooms. In the basement are two hot air furnaces. The building is supplied with city water and gas, and has bath rooms and water closets.

In connection with the institution there has been established for some years past a dispensary for the destitute poor.

The only financial aid the Hospital receives at present is a yearly grant by the City Council of $800, and the payment of the small sum of five cents by patients for each consultation.

Twenty-two patients have been admitted since the opening of the Hospital, on the 1st January last, and on the date of this inspection there were seven patients under treatment, namely, one male and six females.

There is also a large number of out-door patients treated daily. When fully furnished the institution will be very suitable for a small number of patients.

There is a medical staff of fifteen doctors, and two nurses. The Trustee Board is composed of physicians on the staff and others, and there is also an Auxiliary Board of ladies.

I have the honor to recommend that an Order in Council be passed giving authority for the Western Hospital, Toronto, to be taken as named in Schedule A of the Charity Aid Act, and to receive aid in accordance therewith from the 1st January, 1897.

I have the honor to be, Sir,
Your obedient servant,

T. F. CHAMBERLAIN,
Inspector.

The Honorable,
THE PROVINCIAL SECRETARY.

COPY OF AN ORDER IN COUNCIL, APPROVED BY COLONEL SIR CASIMIR STANISLAUS GZOWSKI, K.C.M.G., ADMINISTRATOR OF THE GOVERNMENT OF THE PROVINCE OF ONTARIO, THE 22ND DAY OF FEBRUARY, A.D. 1897.

Upon consideration of the report of Mr. Inspector Chamberlain, dated 18th February, 1897, and upon the recommendation of the Honorable the Provincial Secretary, the Committee of Council advise that subject to the ratification of this Order by the Legislative Assembly, the Western Hospital, Toronto, be hereafter taken as named in Schedule A of the Charity Aid Act, and receive aid in accordance therewith from the 1st day of January, 1897.

Certified,

J. LONSDALE CAPREOL,

Assistant Clerk, Executive Council.

I made an inspection of this Hospital on the 27th April. There were 21 patients under treatment on that date, namely, 6 males and 15 females.

Admitted since the 1st October, 157; deaths 9.

The rooms, beds, bedding, etc., were clean and in good order.

The rooms are small, and the building not well suited for hospital work. There is not sufficient accommodation for the requirements of the west side of the city.

The books are not kept as neatly as they should be, and there is no register in use.

There is a good staff of medical men and nurses. A druggist is in charge of the dispensary for relief to out-door patients.

I inspected this Hospital on the 25th November, and found all the rooms in well-kept order. The admissions since the 1st October were 40, and deaths 5. There is a good staff of medical men and nurses.

ST. JOSEPH'S HOSPITAL, SUDBURY.

The following summaries show the operations of the Hospital during the official year:

Movements of Patients.

Number under treatment 1st October, 1896		
Admitted	191	
Births in the Hospital		
Total number under treatment		191
Discharged	178	
Died	3	
Under treatment 30th September, 1896	10	
		191

Places Received From.

From the Town of Sudbury	26	
From the County of Nipissing	161	
From other counties in the Province	..	
United States and other countries	4	
		191

Sex.

Male	176	
Female	15	
		191

Nationalities.

Canadian	161	
English	11	
Irish	8	
Scotch	2	
United States	5	
Other countries	4	
		191

Religious Denominations.

Protestant	58	
Roman Catholic	133	
Other religions	..	
		191

The following table gives a summary of certain diseases treated in the St Joseph's Hospital, Sudbury, during the year:

	No of cases treated.
Typhoid Fever	..
Typhus Fever	..
Puerperal Fever	..
Cerebro Spinal Fever	..
Diphtheria	..
Smallpox	..

Revenue.

From the Province of Ontario	.....
From the Town of Sudbury	.....
From the County of Nipissing in payment for patients	.....
From paying patients themselves	$ 198 15
From income from property or investments	.....
Subscriptions, donations and bequests	443 35
Other sources	1,436 00
Total	$2,077 50

Expenditures.

Butchers' meat	$ 201 58
Butter	97 44
Flour, bread and meal	130 18
Milk	99 15
Tea and coffee	38 25
Potatoes and other vegetables	49 50
Groceries and provisions not enumerated	96 25
Drugs and medicines	375 05
Surgical instruments	68 40
Medical and surgical appliances	
Beer, wine and spirits	51 55
Bedding, napery and general house furnishings	224 65
Brooms, brushes, mops, soap and cleaning appliances	23 00
Fuel	215 00
Light—gas, oil and candles	49 94
Water	90 00
Hay and straw	
Clothing for patients	51 83
Ice	15 00
Salaries and wages	630 00
Taxes and insurance	200 00
Coffins and funerals	
Contingencies	
Repairs, ordinary	28 00
Total	$2,734 77
Government grant for 1897	$692 52

TORONTO, 5th October, 1897.

SIR,—I made an inspection of the St. Joseph's Hospital, Sudbury, on the 2nd June, and found three male patients in residence.

This hospital was open for the reception of patients last year, the first patient being admitted on the 15th August, 1896, and since that time 153 patients have been received for treatment, and there have been two deaths. The rooms, beds, bedding, etc., were clean and in good order.

The building is a frame structure two and a half storeys high, and is not suitable for hospital work. It contains a sitting room, kitchen, small dispensary and operating room on the ground floor. The public wards and chapel are in the second and third flats. Town water supplied, and the drainage is connected with the town system. The building is fitted with bath-rooms and water closets.

Coal oil lamps are now used for lighting; electric lights have been installed, but are not used. The heating is by hot air. The building is finished with wood sheeting inside; there are no plastered walls.

Dr. Mulligan attends at the hospital daily, and Dr. Howie for consultation when required.

I have the honor to recommend that an Order in Council be passed giving authority for the St. Joseph's hospital, Sudbury, to be taken as named in Schedule A of The Charity Aid Act, and to receive aid in accordance therewith from the 1st October, 1896.

I have the honor to be, sir,

Your obedient servant,

T. F. CHAMBERLAIN,
Inspector.

The Honourable,
THE PROVINCIAL SECRETARY.

COPY OF AN ORDER IN COUNCIL APPROVED BY HIS HONOUR THE LIEUTENANT-GOVERNOR, THE 15TH DAY OF DECEMBER, A. D. 1897.

Upon consideration of the report of Mr. Inspector Chamberlain, dated 5th October, 1897, and upon the recommendation of the Honourable the Provincial Secretary, the Committee of Council advise that subject to the ratification of this order by the Legislative Assembly, the St. Joseph Hospital, Sudbury, be hereafter taken as named in Schedule A of The Charity Aid Act, and do receive aid in accordance therewith from the 1st day of October, 1896.

Certified,

J. LONSDALE CAPREOL,
Assistant Clerk, Executive Council.

Ontario Institution for the Blind.

TWENTY-SIXTH ANNUAL REPORT

OF THE

INSPECTOR OF PRISONS AND PUBLIC CHARITIES

UPON THE

ONTARIO INSTITUTION

FOR THE

EDUCATION OF THE BLIND

BRANTFORD

BEING FOR THE YEAR ENDING 30TH SEPTEMBER,

1897.

PRINTED BY ORDER OF THE

LEGISLATIVE ASSEMBLY OF ONTARIO

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1897.

Office of the
Inspector of Prisons and Public Charities, Ontario,
Parliament Buildings, Toronto, November, 1897.

Sir,—I beg to transmit herewith the Twenty-sixth Annual Report upon the Institution for the Instruction and Education of the Blind, at Brantford, for the year ending 30th September, 1897.

I have the honor to be, Sir,
Your obedient servant,

T. F. CHAMBERLAIN,
Inspector.

The Honorable E. J. Davis, M.P.P.,
Provincial Secretary.

PROVINCE OF ONTARIO INSTITUTION FOR THE EDUCATION OF THE BLIND, BRANTFORD.

TWENTY-SIXTH ANNUAL REPORT

OF THE

INSPECTOR OF PRISONS AND PUBLIC CHARITIES

OF THE

PROVINCE OF ONTARIO.

PARLIAMENT BUILDINGS,
TORONTO, November, 1897.

To His Honour The Honourable SIR OLIVER MOWAT, *Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Member of the Queen's Privy Council for Canada, and Lieutenant-Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOR:

I have the honor to submit herewith the Twenty-Sixth Annual Report upon the Institution for the Education of the Blind, at Brantford, for the year ending 30th September, 1897.

I have the honor to be,

Your Honor's most obedient servant,

T. F. CHAMBERLAIN,
Inspector.

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THE INSTITUTION

FOR THE

EDUCATION OF THE BLIND.

TWENTY-SIXTH ANNUAL REPORT.

This school, established for the purpose of educating and teaching manual arts to the blind children of the Province, has now been in operation for twenty-five years.

Many pupils have graduated and gone out into the world to earn a living, and associate with their fellow citizens, as musicians, teachers, piano tuners, and workers in willow and rattan work, others have attained to a rare degree of proficiency in such industries as sewing and knitting: and a fair percentage of them have been able to earn a respectable livelihood at their respective vocations.

The work done in this Institution since its inception has kept pace with similar institutions in other places, and it has now a teaching staff, and appliances, second to none. There are a good many blind children in the Province who have been deprived of the advantages which this school offers, due in some instances to fear on the part of parents to part with their blind and apparently helpless children, and in others, to the parents or guardians being careless and indifferent about their children enjoying the blessing of a good education.

I strongly concur in the recommendation of the Principal and the Examiners, that a compulsory law such as exists in England (Chap. 42, Vic. 56-57) should be enacted here.

The average attendance of pupils for the past year has been 128, and the per capita cost $256.21, as compared with an average attendance of 127 the previous year and per capita cost of $267.49. The progress made by the pupils in literary work compares favorably with past years as will be seen on an examination of the report of the literary examiners.

Good progress has been made in the musical department, and the commendation in the report of the examiner is well deserved. Much attention is given to the teaching of piano tuning, and pupils have become quite expert in that art.

The instruction given in the willow work branch has fitted a number of pupils, who were too old to take up literary or musical work, to earn a living after leaving the Institution.

The domestic training has done much to enable the girls to attain quite a degree of perfection in sewing, knitting and fancy work.

A cooking class was established and good work was done in training the girls for household duties, such as preparing food, setting table for meals, and other duties of the culinary department. This class has been discontinued for the present.

Good progress has been made with the younger children in the kindergarten class, in preparing them for the more advanced work.

The gymnasium furnishes a most excellent opportunity for physical culture and healthy exercise for pupils who are deprived of sight and thus unable to a great extent to take exercise in the open air. The health of the pupils has been good during the past year, as will be seen by an examination of the attending physician's report. The library is well supplied with books suitable for blind children.

The buildings, grounds and farm are in good order, and the stock well kept.

The officers, teachers and instructors have been zealous in the performance of their several duties. The Bursar's office was found to be in good order and his books, accounts and vouchers properly kept. The management and discipline has been well maintained during the year.

In the reports of my inspection will be found details respecting the buildings, class-rooms, officers' department, industrial work, farm stock, etc. Detailed statements and tables show the movements of the pupils, their nationality, creed, counties from which they come, the work they are engaged in, the cost of maintenance, etc.

There is no material change to note in connection with the staff of officers during the past year.

The estimates for maintenance for 1898 will not exceed those of the past year. I have to thank the officers, teachers and instructors for their uniform kindness to me during my official visits.

Inspections.

This Institution was inspected by me on the 18th May, when there were 133 pupils under instruction, viz., 69 males and 64 females.

Instruction in the manufacture of willow ware was being vigorously carried on, and a considerable quantity of made up stock was on hand.

In the cooking class lately established the girls were being taught cooking and general housework.

And quite a large class of pupils were giving their attention to piano tuning and repairing, under the instruction of Mr. Raymond who is a practical pianist.

All the teachers were apparently taking a thorough interest in their work.

The class-rooms, dormitories, sitting-rooms, kitchen, laundry, chapel, offices of the Principal and Bursar, etc., were all in good order, and the general condition of the buildings and grounds was very satisfactory.

The engine house and machinery were in good order, with a considerable quantity of coal carried over from last year.

Preparations were being made for the annual renewals of flooring in some portions of the building, and of sidewalks and fences about the grounds.

The gymnasium was in good order and well equipped with appliances for the physical training of the pupils.

I made arrangements for the examination of the pupils previous to the closing of the term.

I made an inspection of this Institution on the 13th October. There were 122 pupils in residence on that date, viz., 63 boys and 59 girls.

This term there are 16 new pupils.

Considerable improvement has been made in the building, class-rooms and officers' apartments during the vacation. New flooring, cupboards and closets have been put in; also iron bedsteads have been placed in the dormitories.

The school-rooms, the offices of the Principal and Bursar, and the apartments of the teachers and attendants were all in good order.

The teachers were active in their work, both in the literary and musical departments.

The farm and stock were well cared for, and the outbuildings and grounds in good condition.

The pupils at this Institution, although many of them are totally blind, seem to take a lively interest in their studies, and to be anxious to fit themselves for useful careers.

PRINCIPAL'S REPORT, 1897.

T. F. Chamberlain, Esq., M.D.,
Inspector.

Sir,—I have the honor to present my report of the operations of the Ontario Institution for the Education of the Blind for the year ending September 30th, 1897.

The Institution has now been twenty-five years in existence, and, before drawing your attention to the past year's work I propose briefly to review the progress made from the opening in 1872 to the present time.

The Institution is defined by the statute to be "for the purpose of education, and imparting instruction in some manual art, to such blind persons as are born of parents, or are wards of a person *bona fide* resident of and domiciled in the Province of Ontario." The term "blind persons" as above employed, is held in practice to mean those who, by reason of either total blindness or defective vision, are unable to receive instruction in the public schools. In the British Act of 1893, to which further reference will be made later, I observe the interpretation clause

reads, "The expression 'blind' means too blind to be able to read the ordinary school books used by children." The limits of the institutions in the United States are very similar to the above. Another point in common is shown by a proviso in the British Act that, "Elementary education may include industrial training." The Institution for the Blind here or elsewhere consequently, is a school neither more nor less, only it is, from the necessities of its pupils, a school which undertakes the whole training of the student for usefulness in life, and not merely his intellectual culture. Incidental to the fact that the youth's life from childhood to manhood is, probably, passed in the Institution, he is indebted to it for instruction in his moral and religious duties and obligations, the latter, of course, in their broad sense and without any denominational coloring.

One might suppose that, after the lapse of a quarter of a century the objects and purposes of the Institution were pretty well understood, but the idea that any establishment for the benefit of the blind must be in the nature of an asylum, and its inmates the objects of charity, seems almost ineradicable. Even official documents are not free from the perpetuation of this false and mischievous impression. But, from the first, however beneficent its intentions, the work of this Institution has been educational in the sense above indicated and in that sense only.

Twenty-five years ago the education of the blind on this continent was still, comparatively, in its infancy. The public mind, represented by legislators and governments, had not realized all the possibilities of the effort. Those of us who have more recently entered into the service are enjoying the fruits of others' representations and appeals, as well as being aided to sound conclusions by their experiments and even failures. Previous to my appointment in 1891, great progress had been made during the eight years principalship of my immediate and very able predecessor, Dr. Howard Hunter, himself an educationist of high standing, and possessed of an energy which left nothing undone that then appeared to be necessary to the efficiency of the work entrusted to him and which he was able to secure. For the excellence of its apparatus in certain branches the Institution early obtained, and still maintains a high reputation. So far as the means at the disposal of the management extended, a high degree of proficiency had been reached in both the literary and musical departments, while the industrial was in no sense behind them. In fact the latter was being pushed to a length in excess, in my opinion, of strictly educational requirements. Not a few pupils graduated very soon after I had taken charge whose subsequent record will compare favorably with any who have owed their success in life to their training here. With this simple act of justice to what had been previously effected, I hope to be able to show that the subsequent period has been one of steady advancement.

The Church Organ.

Among the advantages not previously enjoyed was the possession of a fine church organ of Warren & Son's manufacture, which was purchased and placed in the Music Hall, used for both concerts and devotional purposes, and it is not necessary for me to point out the whole of the benefits that have accrued from this acquisition. Previously to this the only practice obtainable by our pupils on the church organ was occasionally secured by the favor of one of the city congregations, and this was ultimately withdrawn. The pipe organ class is now a prominent feature in our daily work. Several pupils have qualified as church organists. The organ has given a higher tone and standard to our whole system of musical instruction. Our pupils, too, frequently have the great advantage of

hearing music of the highest order at rehearsals or on other occasions for which, as much for our benefit as an act of friendly courtesy, our hall is lent to outside city friends. Again, the congregational worship for which the pupils assemble daily in the hall, and the Sunday afternoon services conducted by the city clergy, are made additionally attractive and impressive by such an accompaniment. The effect in this regard is very noticeable and has been the subject of favorable comment by most competent judges.

Piano Tuning.

The appointment in 1881 of a competent instructor in the piano-tuning department in place of depending upon a music teacher for such services may next be mentioned. The Instructor attends on two days in the week. Every pupil (there are usually about twenty) has his attention. On the intervening days practice is obtained on a sufficient number of instruments, the senior pupil of the year being responsible for the safety of the pianos and the diligent application of the learners. The pupils in their final year are also charged with the duty of keeping the pianos used in the Institution for class work in tune and in effecting simple repairs. A commodious apartment has been fitted up with all needful appliances for repairing to the full extent ever required. The work is performed by an efficient sighted workman, engaged for the purpose, in the presence of the older pupils, and the various operations are explained for their benefit. So that they are able, on leaving the Institution, to do all that a blind tuner can be reasonably expected to accomplish. Since 1881 some 33 young men have graduated from this department each one being supplied with a full outfit of tools on retiring. Of these several have obtained distinction in their profession, a large proportion have done well, and while death has removed some and impaired health has interfered with the success of others only three or four at the most can be justly termed failures and this from causes not resulting from their blindness. Besides those who have graduated several have left for various reasons after receiving a more or less thorough course of instruction, but without attaining to full graduation. By entering factories for a short term, or by practice obtained in other ways, many of these are, to my knowledge, doing well at their trade. But the foundation of their success was laid in the assistance the Institution afforded them. I commend our piano tuners to the favorable notice and patronage of the public. Not as an act of charity, but as one of justice, I ask that the blind piano tuner, when he applies for work shall at least have a chance to show what he can do. The fact that some of the finest work in tuning in the world, Canada included, is being done every day by blind men should give confidence. The evidence that an applicant for business of this description is one of our graduates is a guarantee that he will do his work efficiently. I doubt if the same number of sighted men taken at haphazard from the community at large could make a better showing than our graduates of the past fifteen or sixteen years.

Resident Music Master.

Without disparaging in the slightest degree the abilities of previous musical instructors, I may express my sense of the great advantage derived during the past twelve years from the constant presence of a resident music master. Music enters closely and intimately into the daily life of the pupils, it has to be studied and practised at all hours; there is in the case of blind students so close an identification in interest and sympathy between the teacher and the learner, that the former requires, if he is to do all he would desire to do, to be always and readily available. The music master does not generally present the aspect of a trained disciplinarian

But I am convinced that he is, perhaps unconsciously, a most potent factor in the preservation of order and harmony in the Institution. In the personnel of the several appointments successively made to this position we have been singularly fortunate. Originally we were of necessity compelled to resort for help to the New England Conservatory and had no cause to regret the selections made on the recommendations of its management. But, of later years, the establishment of institutions of a musical character and of the highest reputation in the city of Toronto has made a recourse to other schools unnecessary. Our present master is a Canadian: his predecessor was a native of England but for some time domiciled in Ontario previous to joining our staff. The resident music master is, I claim, a decided advantage over the conditions existent before his appointment, which, I may further remark, has not added to the numbers of the staff.

Physical Culture.

It will be universally conceded that no class of young persons can stand more in need of physical culture than the blind, cut off as they are from most of the physical exercises which tend to the robust development of the human frame. A gymnasium would seem to be the first essential in the equipment of an Institution for the Blind. Yet, with the exception of, perhaps, one Institution in England, and one or two in the United States, the gymnasium was, sixteen years ago, all but unknown in this connection. Our earlier efforts were made in an ordinary class-room, while the misgivings and cautious conservatism which are usually enthroned in high places were slowly being overcome. But we have now had for five years a well-equipped gymnasium, sufficiently roomy for our purposes, well ventilated and warmed, and in which our pupils, under a competent instructor, undergo a thorough course of physical training. And this is accomplished without any additional cost except for apparatus. Although the matter has since been taken up by several other Institutions our action in the premises anticipated that of some of the most progressive and most liberally sustained on this continent.

Domestic Industries.

As already mentioned industrial work has always been a prominent feature in our course of instruction. But the more general usefulness of the female pupils in connection with simple household duties is now recognized as a desideratum by all educators of the blind. The cooking class is still rather a novelty but its establishment on a small scale last session placed us at all events on a level with our most advanced contemporaries and ahead of all but two or three institutions.

This review of steady progress and improvement will tend, I hope, to disabuse the minds of any who may have been led to imagine that we have not endeavored to keep fairly abreast of the times. In all that has been done the useful and practical has been sought, not the showy and merely ornamental. Regard has been had to the conditions of life of those to be benefited. And the fact that an Institution for the Blind is always, from its nature, a costly undertaking, even if conducted on the simplest and most economical lines, must impose a certain degree of restraint upon its management when new ideas are presented for consideration.

Education of the Blind in Great Britain.

A pleasure trip to England during the past summer afforded an opportunity of obtaining some information concerning the education of the blind in Great Britain. The time of year was not favorable for seeing the Institutions in

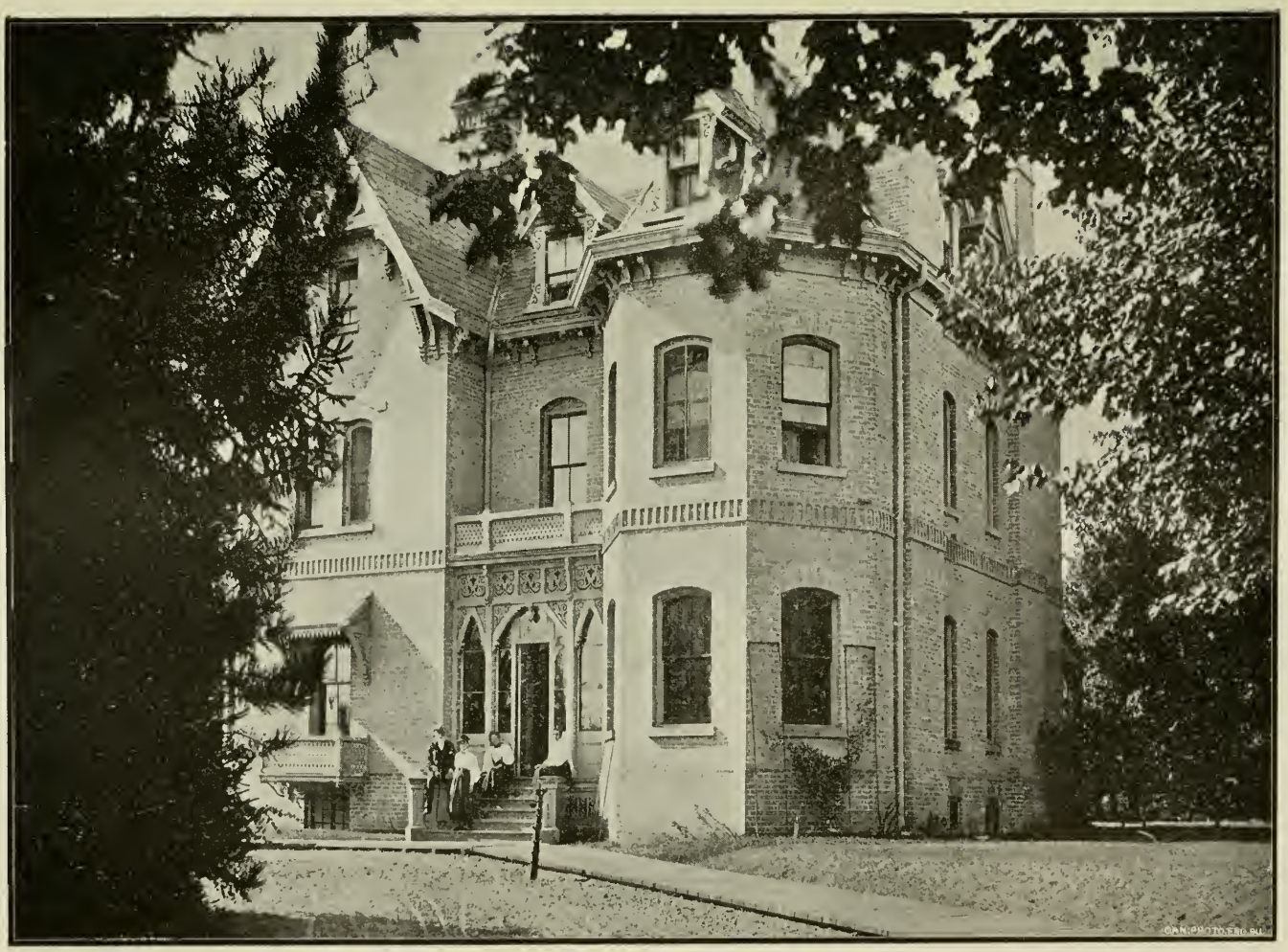
full working operation, as several were wholly or partially closed for the holidays. Where pupils were absent, however, adult industrial work was going on without intermission, and, in all cases, I was favored with the fullest information highly intelligent and experienced officials could supply.

Until the year 1893 the British Parliament had not recognized its obligation to educate the dependent blind, or to provide the means of education for the blind of any class in England and Wales. All had been left to private charity or benevolence. An abounding liberality had, it is true, done something even for the higher education of this class of the community, and much for the cause of elementary education amongst them. But the blind youth of England and Wales received no consideration from the state until the date above mentioned. In 1893, the Act, chapter 42, (56 and 57 Victoria), was passed, as the result of the enquiries of a royal commission and known as "An Act to make better provision for the elementary education of blind and deaf children in England and Wales." I believe a similar enactment already existed in regard to Scotland. By this Act which is really an addendum to the elementary education Act of 1876, the duty of seeing that every blind (or deaf) child, not incapacitated by any other cause than blindness (or deafness), and between the age of seven and sixteen years, shall be educated, devolves upon the school boards. In some instances, a class for blind students is attached to the public school. And either to such school or to a certified school for the blind, every child must go. Parents and guardians must contribute towards the expense in such cases and at such a rate as may be agreed upon. A per capita grant accompanies certification, and that involves government inspection and examinations of a regulation standard. This pretty decided piece of legislation has had, I am informed, a marked effect on the attendance at many of the Institutions. Parents may select their school and those Institutions most favorably known to the public, naturally are preferred. Thus there has been gained by legislation, first, recognition by the highest authority in the Empire, of the capacity of the blind for education on a level with the sighted; second, it is provided that, blindness notwithstanding, they must be educated; and, third, a sound and satisfactory education is guaranteed. Then, again, a healthy competition is excited between the several schools, and the whole question of the education of the blind is lifted on to a higher plane than heretofore. I was not able to discover that, in the Institutions visited, the literary or musical instruction imparted was of a higher class than we or our sister Institutions in the United States attain to. The industrial idea has so large a place in the minds of many, that probably more intellectual studies to a certain extent suffer. But, in the compulsory nature of the Act, England is decidedly ahead of us, and to the infinite advantage of the class affected. Neglect to educate a sighted child, bad as it is, may be ameliorated or rectified by a hundred circumstances. Neglect to educate and train a blind child, means almost inevitably physical, moral and intellectual ruin. He can do nothing, if so neglected, to save himself. And if the Parliament of free Britain can pass a compulsory law to overcome parental indifferences, why should the Legislature of Ontario stay its hand? The compulsory clauses of the Ontario Public Schools Act would appear to provide a machinery through which the names of all children who are prevented from attending school from imperfect vision, might be obtained. I am not apprehensive that, with a sufficiently stringent statute, any actual recourse to legal constraint would often prove necessary.

The problem how to employ the blind profitably, tested by commercial principles, has not, in England, been a success. In connection with most Institutions a large amount of industrial work is carried on sometimes in a separate establishment, often in the same building as the educational branches. While pupils of from fif-

teen to twenty years are trained in learning trades, chiefly willow and cane work, brush-making and mat-making, the bulk of the work is done by blind adults, usually former pupils, some married, and, with a few exceptions, non-resident. These persons receive a regular wage for their labor. They have no financial risk, and, let trade be brisk or dull, and prices rule low or high, the result to the worker is all the same. To the latter, it will be seen at once, the conditions are extremely easy. But I was assured that in England these were the only terms upon which a blind man could secure a living by a handicraft industry. As I have more that once asserted in my reports, a blind man can be taught to do almost anything. It is when he has to face difficulties outside the mere act of production that his troubles begin. Here in Great Britain philanthropy steps in. The Institution becomes his agent, supplies material and a workshop, sells his product, and, if a loss be made, restores the equilibrium from charitable funds. Although in some cases the business of the Institution was supplemented by the sale of certain imported goods, I was not able to discover a single instance in which it was self-supporting. But, that a most benevolent object was attained with the least possible sense of dependence and loss of self-respect to the individual benefited, there can be no question. Of the industries followed, the willow working took the lead, and I naturally felt a special interest in that department. In Great Britain the demand for willow and rattan ware is enormous. Fine basket work appeared to be little in favor, the great variety of cheap German goods glutting the market. But, for a demand for heavy work there appeared to be no limit. The Institutions are all situated in the immediate vicinity of populous centres. These often supply a local demand for special articles used in connection with manufactures or in packing goods. The General Post Office is an enormous consumer of willow-ware. As nearly everything, letters included, can now be sent at the rate of four ounces for a penny, the bulk to be handled is enormous. And so many packages contain damageable articles, that the huge basket with padlocked cover has to be substituted for the leather mail-bag, and, however strongly built, the wear and tear must be tremendous. In the United States, workshops for the blind, conducted on similar principles to those in Great Britain, exist. And I believe the experience as to their financial aspect is about the same. The Institutions I had the privilege of personally visiting were at Bristol, Birmingham, Edinburgh, York and St. George's in the Fields, London, and the Royal Normal School for the Blind at Norwood. The latter, with the exception of one building and a portion of the grounds reserved for a school for higher education, has been taken over and will henceforth be managed by the London School Board. This circumstance affords a striking illustration of the tendency in Great Britain to place the education of the blind on the same footing it enjoys in the New World. While many advantages are to be found in the proximity of such institutions to large cities, a comparison of the limited space and surroundings of most of the schools visited with our own ample and delightful grounds, is certainly favorable to the latter, although, for the former, healthful and airy sites have generally been selected. It was interesting to observe, too, how skilfully some ancient edifices, originally erected for far different purposes, had been adapted to present needs. This was especially noticeable in the Yorkshire School for the Blind at the ancient city of York, founded in memory of the great and benevolent William Wilberforce, M.P., and located in the King's Manor House, forming part of grounds of the Abbey of St. Mary now in ruins. The school building was originally the residence of the Abbots of St. Mary's and afterwards the headquarters of the Lords President of the North. Henry VIII., James I. and Charles I were among the royal visitors entertained and lodged within its walls. Blind children now sleep peacefully in dormitories that were

Girls' Walk and Favorite Shade Tree.



Principal's House.

once halls of feasting and revelry, and the willow workers draw their supply of material from a cellar once stored with Henry VIII.'s wine. The school is, I believe, the oldest of its kind in England. Its superintendent, Mr. A. Buckle, B.A., is a gentleman of a highly cultivated mind and an enthusiast in his profession. Mr. Buckle has collected and published some very valuable statistics on the prevalence of blindness and the possibilities of its prevention. It is interesting to know that the information thus secured points to a diminution in the numbers of the population so affected. I do not doubt that if a fuller opportunity for intercourse with the heads of the institutions in Great Britain should at some time be afforded, quite a fund of useful information might be accumulated.

Attendance, Etc.

The session of 1896-7 closed in June last with an attendance of 133, of whom sixty-nine were males and sixty-four females. Of these fifty-four males and fifty-two females had returned up to September 30th. The addition to these of fifteen new pupils—eight males and seven females—made a total pupil population of 121 at the date above mentioned. It is probable, looking at the subsequent admissions and applications now before us that the number this session will not materially differ from that of last year. The total registrations between September 30th, 1896, and September 1897, was 149 as compared with 141 in the previous corresponding period.

The retiring pupils or those temporarily absent may be accounted for as follows:

	Males	Females	Total
Graduated in Willow work, etc.	3	..	3
" Piano tuning	1	..	1
" Pipe Organ, Piano, Vocal and Theory	..	1	1
" Pipe Organ, Piano and Theory	1	..	1
" Literary studies and industrial	..	2	2
" Industrial classes; advanced in music	..	1	1
Retired, fair attainments	1	2	3
Obtained employment (partial sight)	1	..	1
Left the Province	1	..	1
Excluded (mentally defective)	2	1	3
Detained by illness or for treatment	3	1	4
Left for various reasons	1	3	4
Detained at home temporarily	..	1	1
Excluded for cause	1	..	1
Total	15	12	27

The newly admitted pupils may be classified as follows:

Males—33 years of age	1	..	1
23 "	1	..	1
21 "	1	..	1
13 "	1	..	1
11 "	1	..	1
9 "	2	..	2
6 "	1	..	1
Females—18 "	..	1	1
14 "	..	2	2
13 "	..	1	1
10 "	..	2	2
8 "	..	1	1
Total	8	7	15

I have drawn attention already to the compulsory clauses of the British Act. The need for such a law in Ontario is continually pressing itself on my attention. I may add, too, that the large proportion of cases of blindness preventible by proper measures being taken in the earlier stages of a child's life, suggests another suitable subject for provincial legislation. The law applicable has been successfully enforced elsewhere.

Literary Classes.

The reports of the examiners of the literary classes are sufficiently gratifying in their terms and I do not think they do more than justice to teachers or pupils in that department. Allusion is made in one or two cases to the presence in junior classes of pupils of defective intellect. This is always a drawback to a class, and necessarily reduces the percentage of marks at examinations. It will be observed that I have this year to report three exclusions from that cause. It is not always easy at first to gauge a blind child's mental capacity. Whether there is an actual incapacity for receiving education, or whether the brain is only torpid or the manner constrained from want of any efforts at its development, is often doubtful. Then, too, if there be even a small amount of mental activity it is an encouragement to give it a chance for development, and thus make the young life less a blank and the scantily favored one a little less of a burden. But when it is clearly evident that there is no practical good to be obtained by a continued effort exclusion has to follow.

In connection with literary studies I have, in past reports, shown how few openings appear to exist for any blind student in a literary direction. In the United States or in Great Britain a limited number of blind graduates find employment as teachers of literary classes of blind pupils, and that not necessarily in the institutions where they have received their own education. There is, it will be seen, a possibility of an interchange in this regard. The employment, too, of a larger number of junior teachers in proportion to the scholars in some large institutions than we have considered necessary, enables a few to find a home and maintenance. But here we have no such field. In Great Britain, philanthropy, sustained by wealth, comes to the rescue of one here and there, and private persons of large hearts and well-filled pockets engage the services as private teacher of a blind instructor. But all observation in Ontario, or more properly Canada, strengthens my belief that, unless special opportunities are seen to be open to the blind literary student, our ordinary curriculum will be found as comprehensive as his environment will require or justify.

Music Classes.

I have nothing by way of information to add in respect of music teaching to the report of the Examiner. But that gentleman's allusion to the possibility of attaining in certain cases a higher plane of musical study calls for a word of comment. The Examiner says: "To reach the higher development the study must be made a specialty, and this, I suppose, is not the purpose of the institution, though in some cases it might be well to consider whether it would not be justifiable." He then refers to a pupil of that class then in the institution. Now I take exception absolutely to the idea that the institution is to supersede the work of the College of Music or the Conservatory, any more than that of the Toronto University, or any one of the schools open to a course in arts, or law, or science. We have prepared pupils for matriculation in arts: we are preparing them all the time for entering, if they so desire, the Toronto College of Music, or

the Conservatory. One of our pupils passed his first examination in Theory only last summer with a view to entering the latter school in due course. With the assistance in overcoming merely technical difficulties inseparable from their condition, which is always cheerfully rendered by our teachers, and as cheerfully accepted by the college authorities, nothing stands in the way of a blind student achieving any honors that await musical talent. But our recognized limit is the fourth grade of the College of Music, the teachers' grade, and the point at which like the university matriculant, his studies may properly be carried on elsewhere. The further comment of the Examiner expressed in the words, "it is questionable if the cultivation of very small musical endowments is remunerative," must be answered negatively if we look at the matter from one side only. The commercial value of instruction in such cases is only to be represented by a cipher. But music is not only an article of merchandise. It is the delight of thousands of lives that would perish if they depended upon it for support. And if it is a delight to the sighted, in what a tenfold degree must it be a joy and unfailing pleasure to the blind. If the blind boy or girl can only play simple airs or accompany others on the piano or reed organ his or her every day existence is gladdened by it. That is the other side of the question and it has an appreciable value. Still there is no doubt that, so far as some of our female pupils are concerned, more time has often been devoted to music than the ultimate results have justified. But that opens a further field of enquiry and will be referred to later on.

Piano Tuning.

Our reports of the success of our piano-tuning graduates continue to be very encouraging. Where failures occur they almost invariably arise from causes affecting alike the blind and sighted, and not from any disability inherent in blindness. The repairing shop, first mentioned in my last report, has been an object of much interest and a source of no little improvement.

The Willow Shop.

The following is the report of the Instructor on the operation of the willow shop during the past year:

To the Principal:

Sir,—I have the honor to submit my report upon the operations of the workshop during the year ending the 30th of September, 1897.

The session has been one of steady progress on the part of the twenty-three pupils under instruction. Even some more or less affected by physical infirmity other than blindness have learned to be more or less effective workmen. Several of the more advanced pupils made during the past session an exhibit of willow-ware, rattan chairs, and a variety of other articles at the Southern Fair, held in this city and which attracted much attention.

Three young men graduated at the close of the late session and were provided with complete outfits, the cost of the latter being provided out of the proceeds of sales of the workshop. One of the late graduates, a very skilful workman, is now I believe, acting as instructor in an Institution for the Blind. Reports from graduates working elsewhere continue to be encouraging.

A number of our pupils worked at their trade during the late vacation. One of them earned thirty dollars in his spare time in this way. Another reports

that from his three months' experience he is confident of his ability to earn his living. I expect this young man will be prepared to graduate at the close of the present session.

We have at this time twenty-four pupils attending the shop, wholly or for portions of the day. Many of these are taking their first lessons. Some of the latter are showing remarkable aptitude for their work. One young man in addition to total blindness is also deaf, and needs constant oversight and instruction, the latter through the ear trumpet. Many of his companions have given me much assistance in teaching this young man.

The favorable weather for willow growth has given us a better crop of willow than we have had for several years past. This will reduce somewhat the quantity to be purchased.

(Signed) THOMAS TRUSS,
Trade Instructor.

In contrast to the reports of the deserving and industrious above given I regret to mention one very conspicuous failure. A young man of a restless and wayward habit was among the graduates of last June. He received an outfit and very persistently demanded every article he could have a pretence to need. In less than a month he had thrown up his trade and was looking for another means of livelihood. No doubt we shall hear of him some day as an illustration of the inadaptability of willow work to the circumstances of the blind. But this case suggests the question whether we should not require before granting outfits in future, that some sighted person of reliable character should agree to stand towards the graduate in the position of friend and guardian, and guarantee the *bona fide* application of the outfit for a given period. Many a blind worker who is both industrious and skilful, still needs friendly help to start him on his way. It is not the mechanical but the commercial side of his business for which he is of necessity in many cases unfitted.

DOMESTIC INDUSTRIES.—FEMALE PUPILS.

The sewing, knitting, and fancy work departments have all been well supplied with learners during the past year. And a beginning has been made in the formation of a cooking class in which the preparation of simple food, the orderly setting of meals, and other matters appertaining to culinary duties have been taught. In the sewing work room several pupils were instructed in netting hammocks and goods of that class. One or two male pupils were also as a special privilege allowed to learn this art. I have seen no Institution where either needle work, knitting, and fancy work is more creditably executed than here. Hand sewing is followed on a larger scale in some Institutions than with us, our pupils as soon as they have attained sufficient proficiency being put to the sewing machine, and as that is now to be found in nearly every household the instruction given is of lasting benefit. On the machine a blind worker can do literally anything the machine can be adapted to, and that too as well as a sighted worker. But not so with hand-sewing. Without disparaging commendable efforts in that direction elsewhere, I must confess most of the specimens I have seen have not come up to my ideal and I am sure would not have satisfied our able instructress. On the other hand the knitting machine although the pupils use it deftly enough, is of comparatively little use to most of them in later life. It has to be specially purchased, is somewhat costly, and only in rare instances can the worker find full employment for it when bought. Factory goods too

effectually compete to give the solitary worker a chance. Knitting by hand, unlike hand sewing, can be learned easily, and the most beautiful work executed in it as our frequent exhibits have proved. And this remark applies to almost all kinds of fancy work.

The question how best we can promote the interests of our female pupils is an ever present and very serious one. A very large proportion have an ear for music and practically all can sing more or less. Then in the knowledge of music, even if imperfect, is, as already remarked, a great charm and delight. I believe in giving every girl who has any sort of an ear or voice an opportunity of cultivating them so far as to make the owner's life happier in their possession. But, when the question of giving many of our female pupils a musical education of a higher class is before us, very grave considerations are suggested. In too many instances the opportunities and possibilities after graduation have left fine and highly cultivated talents all but unused. Or the results have been altogether disproportionate to the labor and cost bestowed on their development. Exceptions there are and the helping hand might do something at times to increase the number if it were more frequently exercised. But the proper place for the blind girl after she leaves the Institution is home, either her own or one in which her usefulness will relieve her from a sense of dependence. Most of our female pupils are from the ranks of those to whom participation in domestic work is perfectly familiar. My opinion, therefore, is that more attention may be profitably given in instruction in domestic work in future. I mean in work of general domestic utility. The amount of useful assistance a well-instructed blind young woman can render in a place which with its surroundings is familiar, is greater than most people imagine. Only to ensure handiness and thrift systematic instruction is, in the first place, necessary. That it is for us to supply. In their report the examiners say :—"Practical instruction in baking, cooking and the work of the kitchen generally is sure to be popular among the students and we trust the class will be much larger next year and the facilities for instruction much increased."

Kindergarten.—Primary Classes.

The value of the Kindergarten class in its relation to pupils of very tender years continues to be felt. There are now a dozen little folks in the Kindergarten proper, and some twenty in the primary classes taught by the same teacher in arithmetic and reading.

The Gymnasium.

No better testimony could be found to the beneficial effects of the gymnasium than that of the Examiner in Music in his report. Professor Ambrose says: "I have to remark the growth in the physique of the pupils which has taken place within the last few years, and can only attribute it to the free use of an excellent gymnasium for the growth of the two has been coeval. Certain it is that it exists, and its results are very apparent in the greater firmness and vigor of the work."

Health.—Discipline.

The health of the pupils has been good during the past year. One little girl who came to us during the session, was found to be suffering from tumor on the brain. She was placed in our excellent local hospital, and tenderly nursed until death terminated her sufferings. The conduct of the pupils has been generally satisfactory. It will be seen that one youth is referred to as "excluded for

cause." This was done in the interest of other lads with stronger claims on the Institution than the excluded one, on whom the latter's behavior had a pernicious effect. The possession on his part of a considerable measure of sight had, as in all such cases, a very powerful influence on my action.

The Library.

In addition to our already well provided library, the following books, all in N. Y. point have been procured during the year: Grimm's Tales: Shakspeare's "Julius Cæsar," with Rolfe's notes: Macaulay's "John Milton"; Cooper's "Pilot" in two vols., and Thackeray's "Henry Esmonde" in three vols.

The Grounds, Farm, Etc.

Th remarks of the Examiners on the appearance of the grounds do no more than justice to their gradually increasing beauty. After longer or shorter absences and visits to other scenes and places, the charming aspect the grounds present when the trees are clothed in their summer foliage, is only the more striking. I often regret that a larger amount of labor cannot be systematically bestowed upon them. But perhaps in a certain degree of wildness there is an element of attraction. The farm has been fairly productive during the past season: the orchard, after an abnormal yield last year, has not done much for us; the protracted drought in September has necessarily affected injuriously both trees and field crops.

Visitors.

The number of visitors to see the Institution increases with the growth of the city of Brantford in size and importance, and of the many attractions it presents. All are welcomed who come within school hours and on school days. The Institution is closed to visitors on Saturdays and Sundays. The numerous conventions held in Brantford, by the numbers they bring to inspect our work and methods, tax to the full our attendants' energies. Among the incidents of the past session was a visit *en masse* from the Sons of England who were in session in the city, and a mutually enjoyable afternoon was spent between the pupils and our genial and whole-hearted guests.

The Brant County Teachers' Association again held a session of its annual convention in our hall. The speaker of the evening was Professor Clark, M.A., of Trinity College, Toronto, who took for his subject "Kingsleys' Water Babies," and gave his hearers, who included the educational community of Brantford generally, a most delightful and instructive discourse.

The Brantford Musical Society, under the leadership of Professor Rogers, Mus. Doc., also held two rehearsals in our hall, thus giving our pupils an opportunity of hearing music of the highest class performed by talented proficients in the musical art.

Statistics.

The usual statistics are appended to the report. I may say for the benefit of any who take an especial interest in the economical features of our management, that I have recently, by correspondence, obtained very precise information as to working staff and expenses of other institutions, and shall be happy to prove to the satisfaction of all candid enquirers that, in both respects this Institution will bear comparison with any where equal efficiency is maintained.

ACKNOWLEDGMENTS.

I have to acknowledge once more the many kind and courteous attentions received from the citizens, clergy and press of Brantford. Our relations with our city neighbors have always been of the most agreeable nature.

During my absence in Great Britain the duties of Acting Principal were most loyally and efficiently discharged by Mr. W. B. Wickens the senior member of the literary staff. Although the responsibility of the Principal assumes a different form during the vacation from that which attaches to superintendence during the session it is by no means suspended or even light. I would be wanting in courtesy and justice to a valued and esteemed colleague if I did not thus publicly acknowledge his services which were so thoroughly and completely performed as to leave nothing but current business to engage my attention on my return.

I have the honor to be, Sir,

Your obedient servant,

A. H. DYMOND,

Principal.

BRANTFORD, Oct. 1, 1897.

LITERARY EXAMINERS' REPORT.

To DR. T. F. CHAMBERLAIN,

Inspector of Charities, Ontario.

SIR,—The undersigned, the examiners of the literary classes, in the Institution for the Instruction of the Blind at Brantford, have the honor to submit for your consideration the following report of the results of their labors at the recent examination held of May, 1897.

The weather proved very favorable for an examination, neither hot nor cold. The fine grounds of the institution never looked more attractive at the same season of the year.

The spring had been exceptionally promising, up to that time sufficient heat with abundant moisture. Early in May, before the 12th, the leaves were out, the flower buds had burst, and now the trees were in full foliage and the air was vocal with melody.

Later the continuous cold weather retarded growth and made a late harvest.

To those who remember when the Institution was founded by the late Hon. John Sandfield Macdonald and Hon. Edmund Burke Wood on a bare sand hill with hardly a tree in sight, and see the beautiful park now, the transformation seems little short of marvellous

But not only is the original plot greatly improved, the grounds north and west, subsequently added, is fast overtaking it in the matter of adornment. The trees are growing finely, and the ravine that traverses it may be easily converted into an attractive and romantic spot.

Inside the building everything was found clean and in good order. Class rooms, living rooms and corridors.

The order in the classes and the management were as usual excellent.

The classes and the results are grouped as in former reports.

(c) *Mr. Wicken's Classes.*

(1) Grammar.—Class B. Eleven in the class. Limit: Etymology, inflections, easy analysis. The marks indicate the character of the work done by this class—work that may with truth, be pronounced excellent. Out of a maximum of 100 the lowest marks obtained by any member of the class was seventy-seven and five (nearly half) obtained ninety-six. The average was ninety per cent. They were thoroughly examined within the limits assigned and the answers were full and accurate. The following, among other extracts, was analyzed readily and the words parsed.

"Upon his brow he felt their breath,
And in his waving hair,
And looked from that lone post of death,
In still, yet brave despair."

Great credit is due Mr. Wickens, who is an experienced and accomplished instructor, for the thoroughness and painstaking with which he has drilled his grammar class.

(2) Reading.—Class A.—Fourteen members. Most of the class read in point print with much fluency and with good expression, pausing generally correct as well as emphasis. The average value of the work done was seventy-two per cent.

(3) Physiology, etc.—A class of nine boys. Limits: Outline of (a) bones, (b) muscles, (c) nerves, (d) digestion, (e) hygienic rules. Except in the case of two the work was very well done. They were examined (1) as to the number, classification (a) regions, (b) shapes, composition and functions of bones and joints; (2) as to the general form, composition, color and functions of the muscles; (3) as to the nervous system—its several parts, the ramifications of these and the general and distinctive functions of the nerves of organic and of animal life. Digestion and the digestive organs were discussed and the processes and results got fairly well at, together with the principal hygienic rules to be observed. The answering was very good with the exceptions already mentioned.

(4) Arithmetic.—Class B. There are sixteen in the class. The session's work consists of general arithmetic and fractions. The work has been well mastered, and several of the pupils are qualified to enter a higher grade. In all improvement is very evident, in some it is very great. The difficulties connected with the teaching of fractions are known to all educators. Of course they become greater when the pupils are blind, but skill and patience have overcome them.

(5) Geography.—Class A. The work of this class consists of mastering the British Colonies, their location, products and forms of government. For the purposes of examination we made use of a map of the world in relief. Every colony to the very smallest, was named, found on the map, and described in the respects already mentioned. Mr. Wickens has done his work well, the answers were carefully recorded and showed an average of a little over ninty-eight per cent. We observed that correct pronunciation of proper names had received very careful attention and that the very latest statistics had in every case been used.

(6) Writing.—Class A. The class was requested to write a short letter to the Queen, congratulating her on her long reign; a short note to the mayor of the city enclosing a contribution to the Indian Famine Fund; a note, and an account. The form of the letters was fairly good, the writing legible, and the note correct in nearly all cases.

(a) Miss Gillin's Classes.

(1) Grammar.—Class A. Twelve in the class. Limits, analysis, parsing, philology. The pupils of this class, including several of the more advanced pupils of the Institution, evinced a very satisfactory knowledge of the history of the English language, of its composition and changes, and analyze and parse with facility and accuracy. Some of them were able to show with sufficient clearness the influence exercised by Briton, Saxon, Dane, Norman, in the building up, enriching and adding strength to Modern English, in which are happily blended the sense of the Saxon and the imagination of the Celt. Difficult passages in prose and verse were submitted for analysis and parsing and were handled with intelligence. While none obtained the maximum, a result not to be expected in such a subject, with one exception they all did well, the average mark being 71 per cent. That they had been well instructed goes without saying.

(2) Writing.—Class D. Eighteen in number. About half the class write well and with facility.

(3) English History. A class of thirteen. A very bright, intelligent class as a whole. They were examined pretty thoroughly from the beginning of English History up to 1272. The social, political, industrial position of the people at the different stages was canvassed, the changes effected from time to time, how they were effected and why, the results, the gradual growth of the nation and the constitution. The answering was generally ready and intelligent and satisfactory to the examiner. The average percentage was 75.

(4) English Literature. Twenty in the class. This class comprises the best and most advanced pupils in the Institution, and Literature seems to be the favorite literary subject. The course embraced the history of literature from Shakespeare to the present time. The play of "Macbeth" (thoroughly), the chief works of Mrs. Browning, Tennyson, Stedman's "Victorian Poets," extracts from the writings of the principal poets from Elizabeth's reign down to the present. The examination commenced with "Macbeth," of which an excellent analysis was given by the class. The movement of the play was followed act by act, from the comparatively innocent beginning to the tragic and wicked culmination. The finest passages had been memorized, and were given by the members of the class. The fatal effects of unlawful ambition o'erleaping itself were deduced and the moral lessons of the play duly noted. Other authors—Tennyson, for example—were examined, but with less minuteness, and the answering was generally excellent. The class never did better. The average value of the marks was 95½—very high rating.

(5) Geography B. Fifteen pupils were examined upon the geography of the United States and South America. The pupils have completely mastered these maps, and can find any place of importance on them, or can tell what any particular country or place is after having it presented to them. For instance, the examiner takes from the dissected map Colorado and presents it to the pupil. The pupil recognizes it by its characteristics, locates it by giving its boundaries, points out upon it its principal cities, mountains, &c., and gives a general description of its climate and productions. Another pupil is presented with another State, and proceeds in the same way. Eight out of the fifteen received every mark—average of the whole class was 92 per cent. The tone of the class is very good; the respect for the teacher most evident.

(6) Canadian History. The class had studied Canadian History generally, giving more particular attention to the history from 1812. They were examined

as to their knowledge of the principal men of the different periods and the events connected with their names. They have a very fair general knowledge of all the important events and of their causes and results. Their answering was very prompt, evincing a pretty thorough acquaintance with the matters treated of.

(7) Bible History. This class is composed entirely of young men. They were examined on the subjects of their course, the reigns of Saul, David and Solomon, with such Bible geography as is connected with these reigns. The career of each monarch has been very fairly mastered. The locations of the places where the principal transactions occurred were also denoted. Apart from the knowledge acquired, the study of the Bible under the guidance of a teacher of Miss Gilllin's sterling character must be productive of good moral results.

(8) Arithmetic.—Class C. Fifteen in the class. This class is expected to know the simple rules, the tables of weights and measures and their application in the solution of easy problems in reduction. The work done within the limits was very good. Besides definitions and questions on theory many suitable practical problems were submitted and solved with considerable readiness. Only three got below half marks, one got the maximum and the average was 70 per cent.

(d) Miss Walsh's Classes.

(1) Arithmetic.—Class A. Miss Walsh teaches the highest class in the Institution in this subject. It is composed of ten boys and five girls. The spirit of the class and teacher is excellent, the discipline kind but firm. The desire to do well was manifest in all. The examination consisted of questions in mensuration, insurance, stocks, commission, brokerage, interest, discount and a few analytical problems. The result of the examination was very satisfactory. Three solved all the problems, four obtained over 86 per cent. The work was done very promptly, the time for the solution of fourteen problems being about one hour. Yet every pupil was given all the time he required.

(2) Grammar.—Class C. There were thirteen in this class. The class w examined in the elements of grammar, in parsing, simple analysis and the correction of ordinary errors in English. Most of the class did very well. Their mode of answering is commendable in every way. Great pains have been taken to secure correct forms of expression. This is quite evident from the manner in which they reply to the questions. They are grammatical grammarians.

(3) Physiology and Hygiene.—This class is composed of ten young ladies who are evidently very fond of the subject. The subjects of examination were: The effects of alcohol and tobacco, respiration, digestion, circulation, the skin, the muscles, the bones and the senses. The examination was very exhaustive, covering all the chief points in the above topics. Every answer was carefully marked. The results showed an average slightly over 92 per cent., which is sufficient to show the excellence of the class.

(4) Geography.—Class D. A class of seventeen pupils of somewhat unequal attainments. The limits were: Definitions, counties, railways and physical features of Ontario. The definitions were accurately known. By the aid of the dissected map they could pick out the counties, give their shapes and relative sizes, give and locate the county towns and other principal centres of population, could trace all the principal railways and the cities and chief towns along the routes, find the principal rivers and lakes and islands. The answering was generally satisfactory. One pupil obtained the maximum, the average 60 per cent.

(5) Reading.—Class D. Sixteen present in the class. Miss Walsh teaches the art of reading with much care and good taste. Due attention is paid to pausing, tone, emphasis, expression, so as to bring out the full meaning, which is better done generally than one finds it done in classes of seeing children. In this class it was very well done despite the fact that it was divided into three sections, each reading in a different book. Two pupils reached the maximum. The average was 88 per cent.

(6) Writing.—Class C. Twenty-three in the class. This is, perhaps, the must difficult subject to appraise properly of all those taught in this Institution, the style of writing is so different from the ordinary one. Still, when the obstacles are considered it is surprising what facility they soon acquire in the performance, and how readily the writing is read by those at all acquainted with it. In this class there are several excellent calligraphists. One got the maximum and three 90 per cent., the average being 64 per cent.

(b) Mr. McLean's Classes.

(1) Arithmetic.—Class D. Twenty-one in number, in two sections, taking definitions and simple rules: seven weak members in the class, the rest do very good work. Several simple problems within the fundamental rules were given for solution and the results were generally satisfactory. The average value of the marks was 59 per cent.

(2) Geography.—Class C. Fifteen pupils. Limits: Definitions and the Dominion of Canada in detail. The answering generally was very good. The boundaries were pretty accurately known and something, too, was known of the resources and industries of the country. The pupils were able to point out the various slopes and valleys and the principal rivers that drain them, the chief lines of railway, their directions, the provinces they pass through, and, in Ontario, the counties, with the positions and names of the chief cities and towns *en route*. Average value of marks 68 per cent

(3) Object class.—Fifteen in number, four of whom can do nothing. Articles in common use, such as the ordinary cereals, spices, etc., employed. The answering—considering the composition of the class, was pretty satisfactory.

(4) Bible class.—Number present eighteen. A very satisfactory class. The limit prescribed was from the beginning to the crossing of the Jordan, in review, and Judges. The principal events recorded in early Bible History and the characters connected with them had evidently been well taught and the answering was, therefore, better than it ordinarily is at the present time, this branch of school learning, having long since disappeared from Canadian Schools with the Irish national series of readers. It is not necessary to recapitulate here the course pursued in the examination. The results are indicated by the marks which are pretty uniformly good, the average value being over 75 per cent.

(5) Grammar.—Class D. This is the primary class in this subject. With the exception of two who are evidently mentally defective, the class answered very well. There are some who are quite fit for advancement having mastered the part of the subject assigned the class.

(6) Reading.—Class C. The reading in this class is very good. Care was taken to prevent rote reading by having the pupils commence in the middle of a lesson. They recognize words very readily and correctly. The class was also tested in spelling with very good results. They have mastered the meanings of the difficult words and phrases and read with much expression.

(7) Writing.—Class B. The class was asked to write a note stating the time their friends might expect them home, several figures and capital letters and a short poetical selection. Two gave in excellent papers, five others very good ones. The writing is quite legible, and is done with great care. The general style of all the classes taught by Mr. McLean, is good and the order excellent.

(d) Mrs. Murray's Classes.

(1) Reading.—Class D. This class is made up of the younger scholars o the Institution and comprises about four grades of pupils. Each pupil was examined in reading, spelling and the meanings of words. The reading and spelling are very good, the understanding of the meaning of words fair. The children have been taught to read with expression and in a very pleasant tone. There are seventeen in the class.

(2) Arithmetic.—Class E.—This is a class of nineteen, divided in three parts. The pupils are nearly the same as those in the reading class. They were examined in multiplication, subtraction and addition; the younger ones in counting. The highest grade has mastered the extended multiplication table to twenty times and do problems involving the use of this table very well. A good foundation has been laid for future study.

(3) Kindergarten.—Eleven pupils in the kindergarten, ten present. They were examined in sewing, weaving, clay-modeling, folding and the use of some of the gifts. The work done in each of these is very good. The singing is particularly good. The specimens of the session's work shows a considerable amount of patient effort.

(4) Domestic Economy.—A small cooking class has been started under the superintendence of Mrs. Murray and instructions have been given to the class in those necessary household duties that must prove of great benefit to them. This practical instruction in baking, cooking, and the work of the kitchen generally is sure to be popular among the students and we trust the class will be much larger next year and facilities for instruction much increased.

The Gymnasium Instructor—Mr. P. J. Padden.

We witnessed an interesting exhibition of marching, calisthenics and gymnastic feats conducted by the instructor in this department, certainly one of the most important in the Institution. The marching of the girls and young women was admirable, without a hitch, without a flaw. The calisthenic exercises were also well done. The benefits of the drill are evident in the upright figures and graceful movements of the members of the class.

The gymnastic performances of the young men and boys were of equal excellence. How young people of no sight, or of defective sight, can safely go through such tumblings, climbings and contortions is simply marvellous. And they—the pupils—are plainly proud of it all and are completely and apparently willingly under the control of their drill master.

In concluding our work we take the opportunity of tendering our thanks to the Principal and his staff for their assistance and many acts of courtesy during the examination.

All which is respectfully submitted.

M. J. KELLY,
WILLIAM WILKINSON,
Examiners.

Brantford, 12th July, 1897.

REPORT OF MUSICAL EXAMINER.

HAMILTON, June 1st, 1897.

To T. F. CHAMBERLAIN, ESQ., M.D.,

Inspector of Public Institutions, Toronto.

SIR,—Having again visited the "Ontario Institution for the Blind," at Brantford, and individually examined the work of each pupil there engaged in the study of music, I have again to report a satisfactory result.

Mr. Jaques, who was for several years resident teacher, having resigned his position, Mr. J. Parnell Morris has been appointed in his place, and appears to be filling it with satisfaction to all concerned.

The classes are large, the pupils on the piano numbering between fifty and sixty, on the organ six, in the theoretical and musical history class, sixteen, and in the various singing classes from seventy to eighty.

They employ three teachers—Mr. Morris, Mrs. Plewes and Miss Moore, with Mrs. Murray as teacher in the kindergarten class—and in all there appears good discipline, good feeling and good progress.

I have again to remark the growth in the physique of the pupils, which has taken place within the last few years, and can only attribute it to the free use of an excellent gymnasium, for the growth of the two has been coeval. Certain it is that it exists, and its results are very apparent in the greater firmness and vigor of the work.

The limited general acquaintance with music almost inevitably involved by the capability of learning only through dictation must always be a drawback to the blind, but otherwise their disadvantages are not much evidenced in their work and I think the pupils of the institution would favorably compare with those of other institutions for seeing pupils, always bearing in mind that music is here only one branch of the many sided education given. To reach the higher development the study must be made a specialty, and this I suppose is not the purpose of the institution, though in some cases it might be well to consider whether it would not be justifiable. There is in the present classes at least one pupil for whom should his health be spared, I should anticipate a high position in the musical world, and among the kindergarten pupils my attention was called to a young child gifted with the natural judgment of absolute pitch, that is the capability of naming any tone or combination of tones which may be sounded. This faculty is not common even among trained musicians, but this child appears to possess it through an unerring instinct, and her development will be watched with interest.

Here, as elsewhere, there is a great inequality of natural gifts, and here, as elsewhere, it is questionable if the cultivation of very small musical endowments is remunerative.

The chapel music at morning prayers still maintains its position as a model of congregational singing, musical, universal and hearty.

Thanking all with whom I have been brought into connection for their kindness and courtesy. I am,

Yours respectfully,

R. S. AMBROSE.

REPORT OF PHYSICIAN.

T. F. Chamberlain, Esq., M.D.,
Inspector Public Charities, Etc.

Sir,—I again forward to you my annual report as physician to the Institution for the Blind. I have pleasure in saying that the year ending September 30th, 1897, has been one of the most healthful since the beginning of my medical supervision.

With the exception of one unfortunate brain case, which ended fatally in the hospital on March 29th, we had no really serious cases. The patient just referred to was a female pupil who had shown nervous symptoms ever since coming to the institution. Signs of brain pressure became more marked and she was removed to the hospital on March 21st, and died a few days later. The post mortem examination revealed extensive malignant disease in the right frontal lobe, verifying the diagnosis made previously.

During the year there were a few sporadic cases of mumps, all of whom made perfect recoveries.

In the months of January and February two male pupils and one domestic suffered from pneumonia and convalesced satisfactorily.

On May 13th one of the male pupils suffered from a slight haemoptysis, but gave no further trouble. A male employee has been complaining since the latter part of August. He is troubled with vertigo with rather an obscure origin, but as the patient is now improving rapidly he will, I trust, be able in a few days to assume full control of his duties.

I have the honor to be, Sir,

Your obedient servant,

D. MARQUIS.

Brantford, October 11th, 1897.

ONTARIO INSTITUTION FOR THE BLIND.

Statistics for Year Ending 30th September, 1897.

I.—Attendance.

—	Male.	Female.	Total.
Attendance for portion of year ending September 30, 1872	20	14	34
" for year ending 30th September, 1873	44	24	68
" " " 1874	66	46	112
" " " 1875	89	50	139
" " " 1876	84	64	148
" " " 1877	76	72	148
" " " 1878	91	84	175
" " " 1879	100	100	200
" " " 1880		93	198
" " " 1881	103	98	201
" " " 1882	94	73	167
" " " 1883	88	72	160
" " " 1884	71	69	140
" " " 1885	86	74	160
" " " 1886	93	71	164
" " " 1887	93	62	155
" " " 1888	94	62	156
" " " 1889	99	68	167
" " " 1890	95	69	164
" " " 1891	91	67	158
" " " 1892	85	70	155
" " " 1893	90	64	154
" " " 1894	84	66	150
" " " 1895	82	68	150
" " " 1896	72	69	141
" " " 1897	76	73	149

II.—Age of pupils.

——	No.	——	No.
Six years	1	Eighteen years	10
Seven "	3	Nineteen "	7
Eight "	1	Twenty "	11
Nine "	5	Twenty-one years	7
Ten "	6	Twenty-two "	3
Eleven "	5	Twenty-three "	4
Twelve "	8	Twenty-four "	1
Thirteen "	10	Twenty-five "	2
Fourteen "	14	Over twenty-five years	26
Fifteen "	9		
Sixteen "	10	Total	149
Seventeen years	6		

III.—Nationality of parents.

——	No.	——	No.
American	5	Norwegian	1
Canadian	69	Scotch	18
Danish	1	Unknown	1
English	41		
Irish	17	Total	149
German	5		

Boys' Hill and Play Ground.

IV.—Denomination of parents.

——	No.	——	No.
Baptist	9	Presbyterian	22
Congregational	1	Roman Catholic	23
Disciples	1	Salvationist	2
Episcopalian	45		
Methodist	46	Total	149

V.—Occupation of parents.

——	No.	——	No.
Accountant	1	Marble-workers	2
Agents	1	Machinist	1
Baker	1	Merchants	8
Blacksmiths	6	Mechanic	1
Butchers	1	Physicians	2
Carpenters	7	Painters	4
Conveyancer	1	Piano maker	1
Carriage builder	1	Plumber	1
Clerk	1	Railway manager	1
Cabinet-maker	1	Stone-masons	3
Contractor	1	Railway employee	1
Farmers	41	Shoemakers	2
Gardeners	3	Tailors	3
Government officers	2	Teacher	1
Hotel keepers	2	Teamsters	3
Journalists	2	Unknown	8
Janitor	1		
Laborers	34	Total	149

VI.—Cities and counties from which pupils were received during the officia year ending 30th September, 1897.

County or city.	Male.	Female.	Total.	County or city.	Male.	Female.	Total.
District of Algoma	1	1	2	District of Nipissing	....	2	2
City of Belleville	....	1	1	County of Norfolk	1	1	2
County of Brant	1	1	2	" Northumberland	....	....	....
City of Brantford	2	1	3	" Ontario	....	4	4
County of Bruce	1	3	4	City of Ottawa	5	1	6
" Carleton	....	....	....	County of Oxford	1	4	5
" Dufferin	1	....	1	" Peel	....	....	....
" Dundas	....	....	....	" Perth	....	....	....
" Durham	1	....	1	" Peterborough	1	....	1
" Elgin	1	2	3	" Prince Edward	1	....	1
" Essex	2	7	9	" Prescott	1	....	1
" Frontenac	....	....	....	" Renfrew	1	3	4
" Glengarry	....	....	....	" Russell	1	....	1
" Grenville	....	1	1	City of St. Catharines	....	1	1
" Grey	2	....	2	" St. Thomas	....	2	2
City of Guelph	....	....	....	" Stratford	....	....	....
County of Haldimand	....	2	2	County of Simcoe	4	1	5
" Haliburton	....	....	....	" Stormont	....	....	....
" Halton	....	....	....	City of Toronto	19	15	34
City of Hamilton	2	5	7	County of Victoria	2	....	2
County of Hastings	....	....	....	" Waterloo	3	....	3
" Huron	1	....	1	" Welland	1	1	2
City of Kingston	4	....	4	" Wellington	1	1	2
County of Kent	1	1	2	" Wentworth	1	1	2
" Lambton	2	2	4	" York	....	3	3
" Leeds	2	1	3	*Quebec	1	1	2
" Lanark	2	1	3	North-West Territory	....	....	....
" Lennox	....	....	....	*Manitoba	1	....	1
" Lincoln	....	....	....	*British Columbia	1	....	1
City of London	3	....	3				
County of Middlesex	1	3	4				
District of Muskoka	....	....	....	Total	76	73	149

VII.—Cities and counties from which pupils were received from the opening of the Institute till 30th September, 1897.

County or city.	Male.	Female.	Total.	County or city.	Male.	Female.	Total.
District of Algoma	1	2	3	County of Norfolk	7	7	14
City of Belleville	3	1	4	" Northumberland	2	8	10
County of Brant	7	6	13	" Ontario	6	8	14
City of Brantford	12	8	20	City of Ottawa	13	2	15
County of Bruce	7	11	18	County of Oxford	5	7	12
" Carleton	2	1	3	" Peel	1	1	2
" Dufferin	1	1	2	" Perth	2	8	10
" Dundas	3	3	6	" Peterborough	11	3	14
" Durham	3	3	6	" Prince Edward	5	2	7
" Elgin	4	5	9	" Prescott	2	....	2
" Essex	8	18	26	" Renfrew	7	5	12
" Frontenac	5	2	7	" Russell	3	1	4
" Glengarry	7	....	7	City of St. Catharines	2	1	3
" Glenville	2	2	4	" St. Thomas	3	2	5
" Grey	7	10	17	" Stratford	2	....	2
City of Guelph	2	2	4	County of Simcoe	9	10	19
County of Haldimand	4	5	9	" Stormont	4	..	4
" Halton	6	1	7	City of Toronto	43	28	71
City of Hamilton	11	13	24	County of Victoria	7	2	9
County of Hastings	5	4	9	" Waterloo	9	3	12
" Huron	8	9	17	" Welland	6	3	9
City of Kingston	7	4	11	" Wellington	10	8	18
County of Kent	7	4	11	" Wentworth	8	8	16
" Lambton	12	3	15	" York	17	14	31
" Leeds	12	2	14	*Province of Quebec	3	1	4
" Lanark	2	3	5	*Northwest Territory	..	1	1
" Lennox	4	1	5	*United States	1	....	1
" Lincoln	3	3	6	*British Columbia	1	....	1
City of London	10	8	18	*Manitoba	1	....	1
District of Nipissing	1	2	3				
County of Middlesex	8	9	17				
District of Muskoka	3	....	3	Total	367	279	646

*On payment.

VIII.—Cities and counties from which pupils were received who were in residence on 30th September, 1897.

County or city.	Male.	Female.	Total.	County or city.	Male.	Female.	Total.
District of Algoma	....	....	2	District of Muskoka	....	....	....
City of Belleville	....	1	1	" Nipissing	....	2	2
County of Brant	1	2	3	County of Norfolk	1	1	2
City of Brantford	1	1	2	" Northumberland	...	1	1
County of Bruce	1	3	4	" Ontario	....	2	2
" Carleton	....	....	....	City of Ottawa	4	1	5
" Dufferin	1	....	1	County of Oxford	1	4	5
" Dundas	....	....	....	" Peel	....	....	....
" Durham	1	1	2	" Perth	1	....	1
" Elgin	1	1	2	" Peterborough	1	....	1
" Essex	1	6	7	" Prince Edward	1	....	1
" Frontenac	....	....	....	" Prescott	1	....	1
" Glengarry	....	....	....	" Renfrew	1	2	3
" Grenville	....	1	1	" Russell	1	....	1
" Grey	1	....	1	City of St. Catharines	....	....	....
City of Guelph	....	....	....	" St. Thomas	....	1	1
County of Haldimand	....	1	1	" Stratford	....	....	....
" Haliburton	....	....	....	County of Simcoe	4	1	5
" Halton	....	....	....	" Stormont	....	....	....
City of Hamilton	3	5	8	City of Toronto	13	9	22
County of Hastings	....	....	....	County of Victoria	2	1	3
" Huron	1	....	1	" Waterloo	3	....	3
City of Kingston	3	....	3	" Welland	1	1	2
County of Kent	2	....	2	" Wellington	1	....	1
" Lambton	1	1	2	" Wentworth	....	1	1
" Leeds	2	1	3	" York	....	3	3
" Lanark	1	....	1	British Columbia	1	....	1
" Lennox	....	....	....	Quebec	1	1	2
" Lincoln	....	....	....	Manitoba	1	....	1
City of London	2	....	2				
County of Middlesex	1	4	5	Total	62	59	121

Maintenance Expenditure.

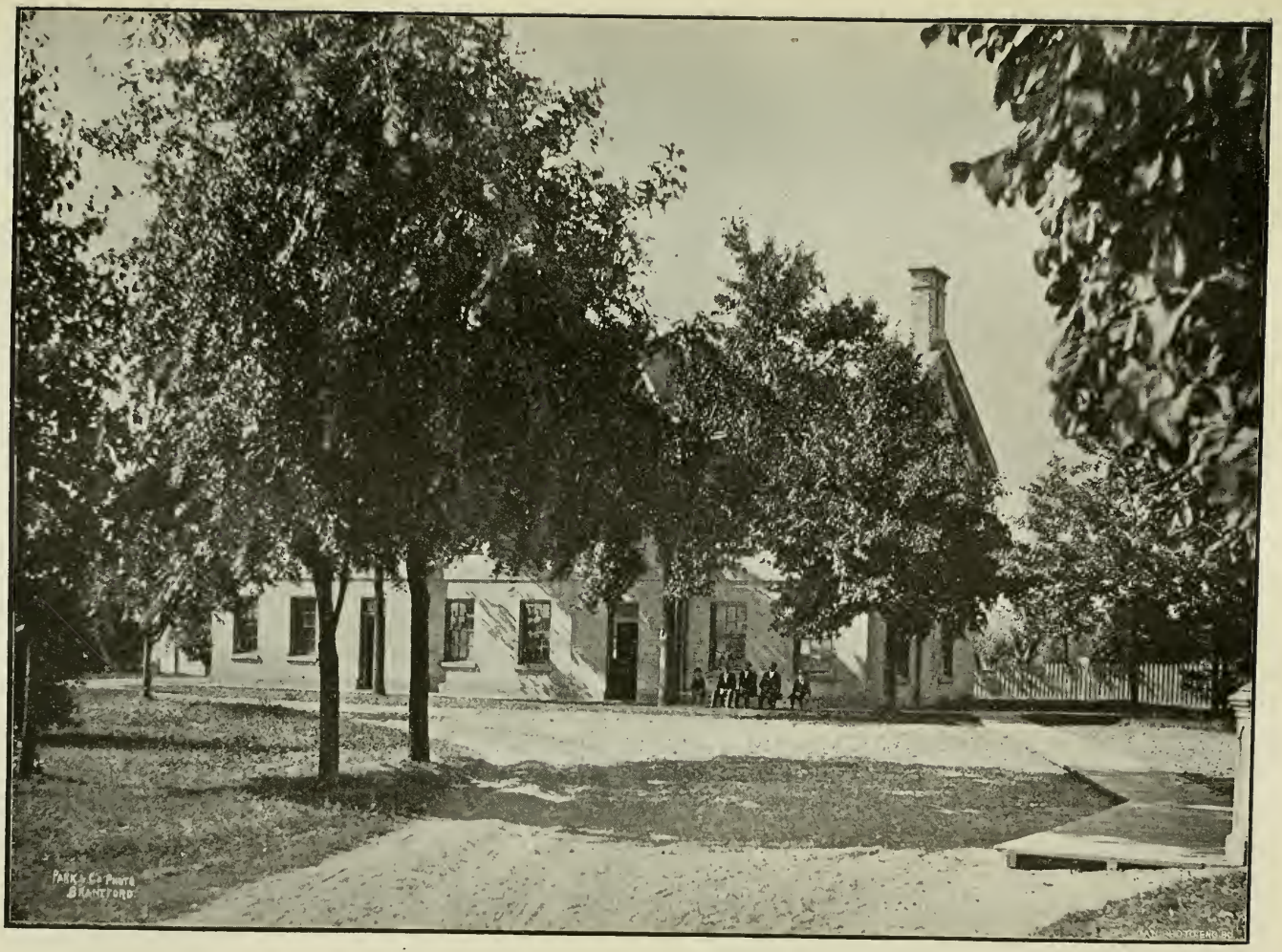
For the year ending 30th September, 1897, compared with preceding year.

Item.	Service.	Year ending 30th September, 1896.			Year ending 30th September, 1897.		
		Total expenditure, 1896.	Weekly cost per pupil.	Yearly cost per pupil.	Total expenditure, 1897.	Weekly cost per pupil.	Yearly cost per pupil.
		$ c.	$ c. m.	$ c.	$ c.	$ c. m	$ c.
1	Medicine and medical comforts...	217 42	3 1	1 71	128 65	1 9	1 00
2	Butcher's meat, fish and fowls....	1,942 92	29 4	15 31	1,800 84	27 0	14 06
3	Flour, bread and biscuits	581 19	8 8	4 57	674 93	10 7	5 27
4	Butter and lard	976 23	14 8	7 69	940 77	14 1	7 35
5	General groceries	1,543 50	23 3	12 15	1,301 22	19 5	10 16
6	Fruit and vegetables	306 72	4 6	2 41	179 21	2 7	1 41
7	Bedding, clothing and shoes.....	647 72	10 0	5 10	780 38	11 7	6 09
8	Fuel	2,955 26	44 9	23 35	3,125 80	47 9	24 42
9	Electric light and gas.....	834 85	12 6	6 57	844 23	12 6	6 58
10	Laundry soap and cleaning	360 14	5 4	2 83	328 34	4 9	2 56
11	Furniture and furnishings.....	412 25	6 4	3 33	540 70	8 1	4 22
12	Farm expenses, feed and fodder ..	1,248 67	18 9	9 83	579 11	8 7	4 52
13	Repairs and alterations	1,038 99	15 7	8 18	674 49	10 1	5 27
14	Advertising, printing, stationery and postages	750 29	11 3	5 90	633 35	9 5	4 95
15	Books, apparatus and appliances .	1,047 52	18 0	8 36	986 04	14 8	7 70
16	Unenumerated	1,478 32	22 3	11 64	1,478 84	22 2	11 55
17	Pupils' sittings at the churches ...	248 00	3 7	1 95	242 00	3 6	1 89
18	Rent for water hydrants	160 00	2 4	1 26	160 00	2 4	1 25
19	Extra water supply	52 36	8	41	53 26	8	42
20	Salaries and wages	17,369 61	263 0	136 77	17,330 50	260 0	135 39
	Totals	34,171 72	5 14 4	267 49	32,782 66	4 92 6	256 21

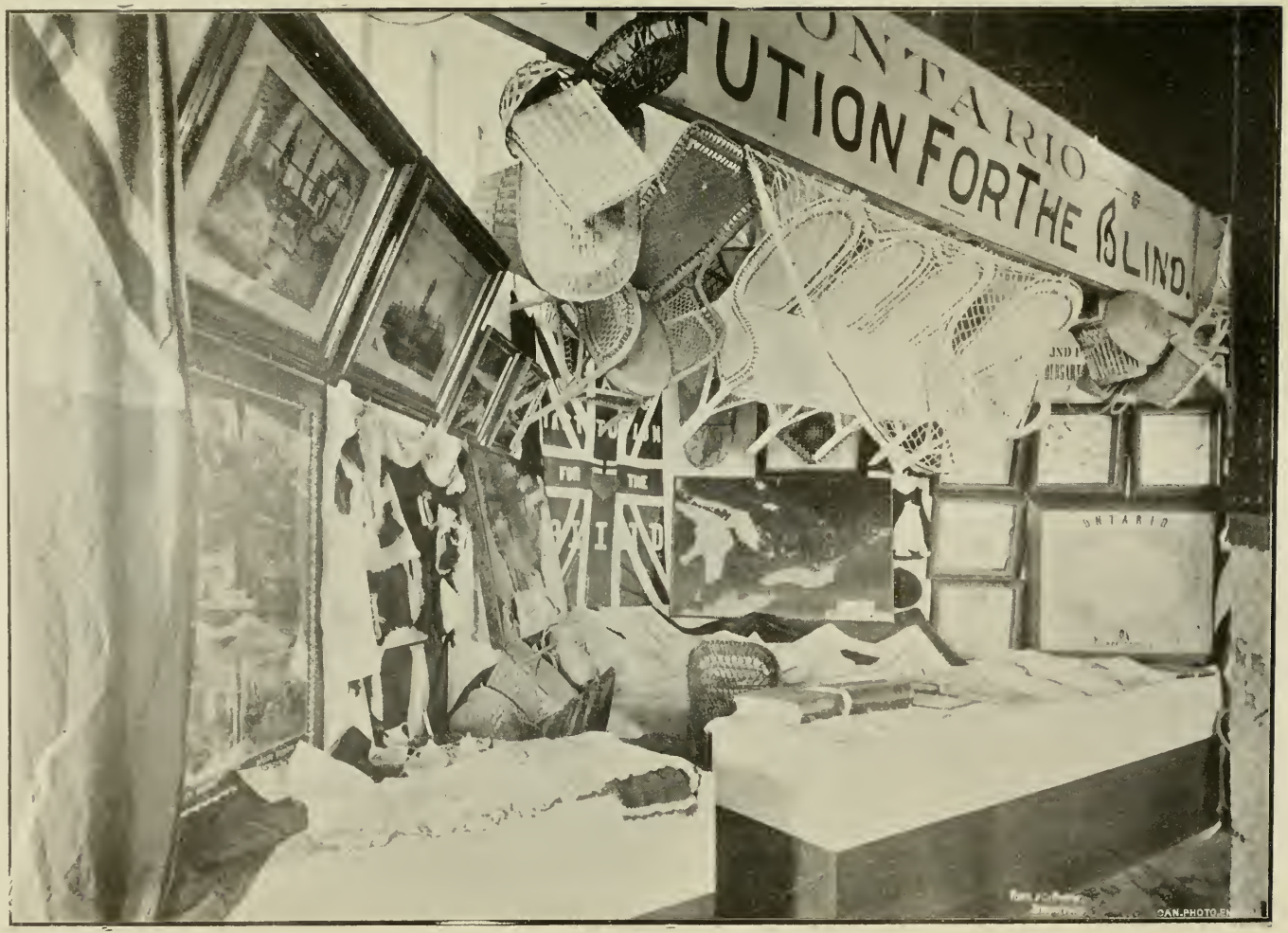
Average number of pupils in 1896, 127.

Average number in 1897, 128.

Bursar's House.



THE WILLOW WORKSHOP.


ONTARIO
TUTION FOR THE BLIND.

TWENTY-SEVENTH ANNUAL REPORT

OF THE

INSPECTOR OF PRISONS AND PUBLIC CHARITIES

UPON THE

ONTARIO INSTITUTION

FOR THE

EDUCATION OF THE DEAF AND DUMB

BELLEVILLE

BEING FOR THE YEAR ENDING 30TH SEPTEMBER,

1897.

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:

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1897.

OFFICE OF THE
INSPECTOR OF PRISONS AND PUBLIC CHARITIES, ONTARIO,
PARLIAMENT BUILDINGS, TORONTO, November, 1897.

SIR,—I beg to transmit herewith the Twenty-seventh Annual Report upon the Institution for the Education of the Deaf and Dumb, at Belleville, for the year ending 30th September, 1897.

I have the honor to be, Sir,

Your obedient servant,

T. F. CHAMBERLAIN,
Inspector.

THE HONORABLE E. J. DAVIS, M.P.P.,
Provincial Secretary.

PROVINCE OF ONTARIO INSTITUTION FOR THE EDUCATION OF THE DEAF AND DUMB, BELLEVILLE.

TWENTY-SEVENTH ANNUAL REPORT

OF THE

INSPECTOR OF PRISONS AND PUBLIC CHARITIES

OF THE

PROVINCE OF ONTARIO.

PARLIAMENT BUILDINGS,
TORONTO, November, 1897.

To the Honorable SIR OLIVER MOWAT, *Knight Commander of the Order of St. Michael and St. George, Member of the Queen's Privy Council for Canada and Lieutenant-Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOR:

I have the honor to submit herewith the Twenty-Seventh Annual Report upon the Institution for the Education of the Deaf and Dumb, at Belleville, for the year ending 30th September, 1897.

I have the honor to be
Your Honor's most obedient servant,

T. F. CHAMBERLAIN
Inspector.

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THE INSTITUTION

FOR THE

EDUCATION OF THE DEAF AND DUMB.

My report for the year ending 30th September, 1897, will be found to contain much additional information as compared with former years. A large number of extracts are given from letters received by the Superintendent, Mr. Matheson, from the parents and guardians of the pupils in attendance at the school expressing appreciation of the progress made in their studies, the good health they have enjoyed, etc. Also from those who have graduated from year to year as to their success in their various trades and callings. These will be read with satisfaction by those who take an interest in the education of deaf mutes; and the expressions of gratitude to the superintendent, teachers, and officers of the Institution for their care and attention; and to the Government of the Province for providing an institution which affords a fairly good education and training for the duties of life, is highly gratifying and encouraging.

Owing to the want of more accommodation, such as school rooms, dormitories and dining-room, as well as additional teachers, many applicants have had to be refused admission during the past year. A year ago the school was overcrowded with an attendance of 272; and this year only 266 could be provided for. There is urgent need for a building for school rooms, and the enlarging of the dining-room and dormitories, so that accommodation for at least 350 may be available. The number of pupils in each class is too large, and more teachers are required to do effective work.

Seven years, the present limit for the attendance of pupils, is too short and should be extended to ten years, which is about the length of time that hearing and speaking children attend our public schools.

The school should be free for all deaf and dumb children in the Province, and the attendance of every deaf and dumb child, physically fit to receive an education, should be compulsory, commencing at the age of seven or eight years.

It will be seen by the report of Mr. A. B. Davidson, B.A., Public School Inspector, that good literary work is being done and commendable progress made by the pupils.

All departments of the school are in good working order. The only change in the staff during the year is the employment of an additional oral and articulation teacher which was much required and will enable a larger number of pupils to have the advantage of instruction in speaking and lip reading.

Nearly all the pupils are diligent in their studies and desirous of fitting themselves for the duties of life, especially the older ones who have not had the advantage of attending school in early childhood and who feel that they must now make extra exertion. The various trades and industries taught to the pupils have been the means of fitting many of them for earning a comfortable living after leaving the Institution.

The health of the pupils, during the year, has been good on the whole, as will be seen by the report of the attending physician, Dr. J. E. Eakins.

The produce from the farm was larger during the past year than in previous years, and under its new management this department is much improved and carried on at less expense.

The Superintendent's report contains detailed statements as to the pupils, teachers, officers, and the general management of the Institution.

During the last year the per capita cost was $170.22; and the average attendance of pupils, 266. While in eighteen similar institutions in Canada and the United States the per capita cost was from $187 to $342, or an average of $257 per pupil.

My reports of inspections made during the year are appended in which will be found details of the condition of the buildings, grounds, farm and stock, bursars' department, industrial work, etc.

The officers, teachers, and instructors are well qualified for the work they perform, and are zealous in the execution of it. The superintendent looks carefully after every detail of the work and management, and to his careful oversight may be attributed the low per capita cost.

The estimates for maintenance for the year 1898 are being prepared with care, and will not exceed the expenditure in former years.

My thanks are due to the officers, teachers, and instructors for their courtesy during my visits to the Institution, and their willingness to furnish me with all information as to the work, and for strictly enforcing all regulations effecting the general management.

Inspections.

My first inspection for the current year was made on the 15th January. There were 266 pupils in residence, 152 boys and 114 girls. It was found impossible to continue the full number of pupils that were in attendance last term, the accommodation being inadequate. Consequently admission had to be

refused to a number of the older pupils. The average number of pupils to each class is about sixteen. Part of the building used for store purposes has been taken for class-rooms, and the upper part of the store building for dormitories.

I found all departments of the Institution in satisfactory order. Good work was being done by the pupils in the printing office, boot and shoe shop, and carpenter shop. The store department was clean and well kept, also the hospital which is ready at all times for the reception of the sick.

The outbuildings were all in a good state of repair; the farm stock was healthy and well cared for.

In addition to attending the various literary classes, the children are taught housework, sewing, knitting, type-setting and printing, shoe-making, carpenter work, etc.

I made an inspection of this institution on the 8th October. There were then 271 children (152 boys and 119 girls) in attendance, and a number of applicants had to be refused admission owing to the lack of dormitory and dining-room accommodation.

The school-rooms, dormitories, apartments of the teachers, officers and attendants were in well kept order; also the chapel, wash-rooms, bath-rooms, water-closets, laundry, etc., were in good condition.

The water appliances have been carefully looked over and tested from time to time.

The number of children allotted to each class is somewhat larger than is desirable; but owing to the large attendance and want of more teachers, this state of things cannot be avoided at present.

The offices of the Principal and Bursar were in good order, and their books, vouchers, etc., kept in a proper manner.

The carpenter shop and shoe shop have been well managed, and the boys receive instruction daily in those trades. The printing office also is doing good work, the boys taking great interest in setting type and doing the usual press work.

The general health of the inmates was good; there was only one case of sickness in the hospital.

The farm property showed better management than heretofore, and the stock and products of the land are considerably improved. The stock comprises five horses, seven cows and thirty pigs, as well as poultry. The stables were in good condition.

The installation of an electric light plant has been completed, and it is expected that electricity will be used for lighting after the commencement of the new year.

REPORT OF THE SUPERINTENDENT OF THE ONTARIO INSTITUTION FOR THE DEAF AND DUMB.

BELLEVILLE, September 30th, 1897.

DR. T. F. CHAMBERLAIN,
Inspector of Prisons, etc.,
Toronto, Ont.

SIR,—I have the honor to submit the Twenty-seventh Annual Report of the Institution for the Deaf and Dumb, for the year ending the 30th of September, 1897.

In previous reports efforts have been made to set forth clearly the nature and objects of the work that has been and is being done at the Institution. A brief history of the inception and growth of deaf-mute education in Europe and America has been given, leading up to the time when this beneficient work was first undertaken in this Province. The special characteristics and aptitudes of the deaf were pointed out, and a contrast drawn between the time, not many decades ago, when the deaf were classed the feeble-minded, and considered incapable of being educated, and the present, when splendidly equipped schools and expert educators are provided for the deaf by every civilized country. It was shown that the deaf were like unto other people, with similar dispositions and temperaments, like mental capacities, and in most cases equal natural abilities and gifts—with the one exception of deafness—and actuated by the same motives and inspired by the same hopes and aspirations; and that the average deaf child is capable of mental and moral development nearly, if not quite equal to, that possible to the ordinary hearing and speaking child. This was followed by a discussion of the various methods employed in the education of the deaf, and the superiority claimed for the Combined System adopted here, as shown by the testimony and endorsation of a large majority of the educators of the deaf, by the adoption of this method by nearly all the leading schools in America and by the satisfactory and superior results attained where it is in vogue. The importance was next pointed out of such manual training being given the pupils as will enable them to earn a competent livelihood, and the extent to which such training is here given indicated. The disadvantages under which this Institution suffers from lack of sufficient accommodation, from too few teachers, and from a too limited school term, were also strongly emphasized and the requirements set forth that were necessary to enable us to do the best possible work. Taken altogether these various reports give a succinct but sufficiently explicit resume to enable any person interested to comprehend the nature, extent and purpose of what is being done. Having thus shown what we are desirious of accomplishing and what methods and means have been and are being employed to this end I now give, as following in logical sequence, the testimony of those specifically interested as to the measure of success that has been attained. In July last I sent the following letter to the parents of children attending the Institution:—

"To Parents and Guardians:—Kindly write and let me know if your child arrived at home safely and in good health. At the same time please inform me if your child has improved, or otherwise, since coming to the Institution. The examination papers were taken home by all the pupils, that the parents might read them and judge of the progress of their children; I hope you have examined them and awarded praise were deserved. A little judicious commendation from parents is a great incentive to pupils to make renewed efforts and a valuable aid to all of us in their instruction. The session just closed was a pleasant and profitable one for all concerned.

There was very little sickness in the Institution ; those who were ailing received the tenderest and kindest possible care. Our best efforts are always devoted towards making our children happy and comfortable, and instilling into their minds sound moral principles that they may grow up to be good men and women, a help and comfort to their parents, a credit to themselves and to the Institution. I send you herewith an addressed envelope and would be glad to have a letter from you as soon as possible.

I also sent a letter to each of the former pupils whose whereabouts was known to me, as under :—

"To Former Pupils of the Institution :—Although you have left the Institution I need hardly say that all of us here take a great interest in you still and would be pleased to hear how you have been getting on since you entered upon life's duties. What are you doing and how are you prospering? Do you think the instruction you received at the Institution made you a better man or woman and added to your enjoyment and happiness in life? Our old pupils are scattered far and wide, all over America, and some in Great Britain, but wherever situated our heart-felt good wishes are with them and I would like to hear from each one occasionally. The deaf boys and girls who were with us and have gone from us seem part of our life, and we cannot forget them. I send you herewith an addressed envelope and would be glad to hear from you as soon as possible. If you know of former pupils to whom I have not written, because I have not their addresses, kindly get him or her to write me a letter without delay."

The letters from parents give their views as to the extent of the improvement they have observed and the value of the efforts that are being put forth on their behalf. Those from the graduates shew to what extent they are prospering in life and to what degree the education and training received at the Institution has aided them in attaining such means of success as they have achieved. These letters are free unbiased expressions of opinion—the pertinent matter in every letter received, whether expressive of satisfaction or otherwise, has been given ; and it is gratifying beyond measure that the testimony is so nearly unanimous as to the excellence of the work being done at the Institution and the inestimable value an education is to the deaf.

What the Parents Say.

N. A. Prescott.—We cannot thank you enough for the interest you take in Alva. Every term we see a marked improvement in both learning and conduct. We have no doubt you and yours do all in their power for those under their charge. Alva always looks to the time of going back with pleasure.

W. H. A., London.—Regarding Ethel I must say that we are not only satisfied with the progress she has made, but we are surprised at it. When we come to consider the utter absence of knowledge, of language, etc., of the pupil upon entering, and the progress in that language, there is no room for anything but entire satisfaction. Her papers I always examine closely, and the progress is much more marked than with pupils in our public schools, who have the advantages of all the senses. Her treatment while with you must be kind from the fact that she is always ready to go back, and ready to cry if it is hinted to her she is not. That speaks for itself. We cannot thank you too heartily for your treatment of our daughter in the past, and of ourselves, and we wish you and your Institution every success.

T. A., Toronto.—We are much pleased with the improvement George has made, not only this year but every year since being there ; and for the short time that he has been in the shoe-shop he has got along wonderfully, as he has been showing some of it at home. We would be pleased to have him remain in the shoe-shop as he will follow that trade.

Mrs. P. A., Toronto.—I and my husband are well pleased with Anna's progress. I think she has done wonderful well this last term. I can see a marked improvement in her, and I am most thankful to you and all the teachers for the kindness you have shown to our dear Anna, and I hope God will bless you all in the good and noble work you are called to do and have done

J. B., Coe Hill.—We are well pleased with Annie's improvement this year. I think she has greatly improved in every way. We are well pleased with her in every way, and we, as her parents, thank you most heartily for your kindness to our dear daughter.

D. B., Windham. Duncan has improved greatly ; everybody says so.

G. B., Jocelyn, St. Joseph's Island.—I feel quite confident you would do all you could for the children, for which you have my sincere thanks. I would have liked to have seen them as it would go a great way to cheer up my lonely life. God bless you for all your kindness to them.

Mrs J. B., St. Catharines —I am very much pleased with Maude. She is quiet and obedient at home and seems to understand what you would like her to do or not to do. I am very much pleased with learning she has had at school, as I am sure we could not begin to teach her at home the same as you do at school. I shall be only too glad to let her return to school as long as you will let her go, as I know it will be all for her own good in the days that are to come. I hope that God will reward you if I cannot, I am sure He will bless you all who have the care of my dear girl in the Institution.

F. W. B., Sydenham.—We have found a very decided and gratifying improvement in Elmer's education this last year. Upon examining his papers and exercise books I was wonderfully surprised and pleased to see that this knowledge of things was so extensive. The only regret I have is that he has so little desire to enter into conversation with any person. If he were more inclined to talk and ask questions I think his English would improve much more rapidly. His brother, Gerald, is now eight years old, and we purpose sending him back with Elmer, providing there is room for him. Both his mother and myself thank you and your able staff for the very kind interest you have taken in Elmer's advancement.

J. B., Tilsonburg.—There is nothing gives me more pleasure than to write you as my son is well and is so well informed after taking only three terms at your school, and every person meeting him can see such a difference in him. I think that every person who has a child who is in need of the mute school should take advantage of it, as I could not have had him treated so kind and come home so well informed as he is. You and the rest have the best wishes of myself and family and every person.

A. B., Murray.—We are well satisfied with the improvement of Florence in learning.

B. B., Maynooth.—I feel very much pleased with the progress my boy has made since he first went to the Institution. I cannot find words to express my thankfulness to you and to all concerned.

C. B., Markdale—We are very pleased to see how Robert has improved since he has been at school. We think he has done wonderful for such a short time. We have examined his papers and we give him praise for what he has done, and he is a good boy. He is always writing and studying; he seems to have a great interest in his books, and I try to teach him all I can. We are very glad that he wants to go back again after holidays are over. He speaks well of all in the school and likes his teacher. We thank you very much indeed for the care you have bestowed upon him. We think the Institution is one of the grandest things there is for such as he.

Mrs. J. B., Wicklow.—George is a comfort to me even now with the learning he is receiving at your noble Institution. I am sure he will grow up a useful man if he is spared to me. I have never been so well pleased with him as I am now. I think he has improved more this last term than ever before. He seems to understand more than one could expect for the length of time he has been at school. I have examined his papers and I think they are good and very neatly done. One person said they doubted if any boy in our school here could have done any better. Many are the words of commendation you receive from those who are watching the progress that George is making at school. Every person who sees him is pleased with him. He is obedient, kind and loving. It scarcely seems possible that any parent could be so cruel as to deprive a child of all the advantages they receive at your school. I do appreciate and am thankful for all the kindness George received at your school both in sickness and health.

Mrs. M. B., Marsville.—I think Wilson has got along well at the Institution, in both the day school and the Sunday School, and has had the best of training, which I am thankful for; and I hope with God's blessing he may be able to earn a living.

P. B., Petrolia.—In her lessons my daughter has made very good progress. I thank you for your care of her and the great benefit she is receiving from your Institution.

C. B., Monticello.—We are very much pleased to note the improvement in our son in all ways. We think it is really wonderful to see the way he gets along at your school, and he seems to thoroughly understand his examination papers. He is trying to teach his brothers and sisters and takes great delight in it.

Mrs. T. B., Barrie.—I think John has greatly improved since he has been going to your Institution. I was thankful to hear him speak the Lord's prayer, and I am ever thankful to you for your kindness towards him.

T. B., Sarnia.—Tommie arrived here all right, and everyone that knew him say they never saw him look so well before, and he is so mannerly also that I think it would be well for some

of the others to go to your school too. The teachers must have been very good to him indeed to make him want to go back again so soon. He is very much improved in every way. He has done wonderfully well at school, and his examination papers were excellent. We are very thankful to you and all the teachers for your care and kindness to our child.

E. B., Valentia.—I was thankful to see Eva so strong and healthy and willing to work. I can tell you there is a great change in her since she started to school. You see she was the oldest, and spoiled on account of her lack of hearing. It seemed useless to whip her when she did not know right from wrong, or good from bad, and never would have if she had not gone to the Institution. I am thankful there is such a place, and many a prayer I offer up for that school and those in it. They must have their own share of trouble trying to teach such a lot of helpless children, and how they make such good progress is astonishing to me. Poor Eva takes such interest in reading. I often wonder how she could spend her time if she could not read. I think it would be so dark and lonely for her only for her learning. She takes great interest in baking and she is always full of fun. We tell her for fun that we will not let her go back, but she won't listen to that, she shows us she is going back for sure. She always speaks well of the Institution, how well she is used and what nice times she has there, it would grieve her terribly if she could not go back. I think she has improved splendidly in her studies as well as herself. I cannot tell you how thankful I was the other day. I was making up the price of a load of oats, so I set it down and reached it to her just to see what she would say. She took the paper and it was not many minutes till she handed it back to me correctly done. I felt thankful to God that I took her to school. Besides, it gives me so much comfort to see her sitting reading so contented. I thought it hard at first to send her away from us, but I think now it was the best day's work I ever did. She is highly delighted to think they let her try to learn to mend, i shows me plainly there is good useful knowledge taught to them. I hope God will grant to al connected with the Institution a rich blessing for their faithfulness.

Mrs. A. C., Chatham.—I am pleased that Melvin is getting on so nicely. There is never a day of my life I do not thank God that there is such an Institution as yours, where those poor deaf children can be taught. I thank you most sincerely for your care and kindness of Melvin.

Mrs. C. E., Ottawa.—My boy came home safely and I have found him greatly improved in all points.

J. B. C., Alfred.—My son has improved in all respects. He will return again and follow your advice as to the calling he is to follow next year, and the division of his time between study and trade. I am obliged for your kindness to the boy and desire to express my high appreciation of the Institution.

Mrs. C., Cobourg.—I am very thankful to you for all you have done for Arthur and that you will take him back next year. I am very pleased with his examination papers and I think he has improved a great deal for the past year. I know he will be a great deal benefited by going to school again, and I am only too glad to be able to send him back. I often think I don't know what we would do only for your good school.

T. H. C., Clinton.—I must say my son has improved beyond my expectations. I examined his papers and find a marked improvement. If he improves as well in future as in the past I will look for a smart boy. When I send my boy to you I have all confidence in you and your able staff of teachers, and the Institution, I must say, is a credit to this Canada of ours.

C. C., Huntsville.—We are well pleased with the work our boy has done and we thank you very much for the pains you have taken with him.

Mrs. A. C., Chatham.—I can say that Melvin is making good progress in his studies, and he is a truthful, obedient boy in every way. I have such confidence that he has the very best of care and instruction that it has made me neglectful in writing to you. I thank you most sincerely for your kindness and care of Melvin and if you do not hear from me oftener it is not from neglect but perfect confidence that Melvin is all right in every way.

M. C., Rochefort.—I am well pleased with the improvement my daughter, Rose, has made. My pen is not able to give you and your officers and teachers such praise as they deserve. Rose likes being at the Institution.

Mrs. B. C., Woodstock.—I am so grateful to you and to all in the school for what you have done for my little boy. He has improved in health and he has done splendid in learning. We feel more than we can explain in thanking you all for what you have done for him. His little sister has been going to school for years and cannot do what he can do in figures and writing. All the neighbors around are surprised to see the improvement in him in learning. It is a great comfort to parents to know there is such a lovely home for such children. It tells how kind you all must be to them or they would not be so anxious to go back. My little boy is packing up every week when I get his washing done so he can go back to you.

Mrs. G. C., Bartonville.—We think our little daughter has improved wonderfully in her health and also in learning. In fact she has improved more than we expected she would in education She was anxious to show us how much she had learned. We gave her a slate and pencil and she would write words and tell us what they were by a motion of her hand. We can talk to her nicely now.

H. R. C., Listowel.—Our boy came in good health, and by looking over the examination papers it is astonishing how you make progress with the children when you can't speak to them and make them understand as they do in other schools. We are well pleased for the time he has been there, and I am sure that if he attends your school another four years he will be well able to get along through the world as well as most scholars in public schools for twelve or fifteen years, for I am sure he is farther on now than pupils in the public schools who have attended school for six or eight years, and there are other parties who say so too. We feel as though we could not sufficiently express our heartfelt thanks to God for ever putting it into the heart of man to erect such an Institution where such children can be educated and prepared for any avocation in life. I have met with some of your pupils that have gone through their school term and they are smart and active and prepared for any question you may ask them. May I then ask you to please accept our kindest regards to yourself as Superintendent and also to the teachers and all connected with this great work in caring for the children at the Institution.

G. C., Maynooth.—I am well pleased to think you take an interest in your pupils, Emma knows the letters that come from you and seems so glad. After she came home from the Institution she had very good health but this summer she has been very sickly. I hope that God in His mercy will ever be in your Institution.

Mrs. C. C., Prescott.—We think Vasco has improved quite a lot and we intend sending him back next term. We are very thankful to you for your great kindness. We would like for him to learn a trade if he is old enough.

W. C., St. Thomas.—We are much pleased with Willie's success. If you could have heard the praise he got you would have felt as proud as we did. His examination papers were all taken into the Myrtle school and they said they doubted if their school could do better. I show them to all my friends and they all speak well of them. I am very thankful to see him so well learned. He seems to be very truthful and I watch him very close.

Mrs. H. C., Meaford.—Hugh would like to go back to school but it is impossible. He missed his schoolmates and teachers greatly. I thank you deeply for your kindness to him, and I can highly recommend the school to the parents of any deaf children. I cannot express the deep gratitude I feel.

Mrs. S. A. C., Toronto.—Martha has now better health than she ever had before. Great thanks to you for your kindness to my little girl. I think she has greatly improved and she gets great praise for her work. Her papers have been shown to a great many people and they all think she is awful smart for the second year. I feel very proud and I cannot thank you too much for your kindness to my dear little girl. I don't think Martha could be any happier than she is. She went to church every Sunday and she seemed to enjoy it so much.

Mrs. B. C., Johnstown.—I cannot tell you how pleased I am with Harvey, he has done so well. It must be a hard task to teach them, and must try one's patience greatly. What can I say or do to express my feelings, Harvey has done so well and you have been so kind.

Mrs. J. W. C., St. Marys.—Cora writes very nicely and I am sure I am well satisfied with the learning she has received in such a short time and of the kindness shown to her. I am so surprised she is so anxious to go back to school. I am ever grateful to you for the kindness she received while at school.

L. P. C., Creemore.—We were very glad to see Ida's examination papers, how well she got along. She is a lovely writer and a splendid worker around the house.

J. C., Oakville.—We are very much pleased with May's progress in her studies and her health is very satisfactory, and reflects credit on the teachers and on the Institution. We could not be other than pleased with the evidence of your painstaking with her and we shall be pleased to have her remain with you for some time yet. It must be no small task to care for so many children of different dispositions and temperaments and to maintain the order and promote the good feeling that so unmistakeably exists among the members of your school.

J. D., Fletcher.—Minnie has improved greatly. The neighbors notice a great difference in her. She knows about nearly everything you tell her, and understands pretty well.

W. D., Lady Bank.—William is very much improved. I am very thankful to you all at the Institution for your interest in and care of my boy. He is improving in his talking a great deal and in his general conduct, showing that he is being taught right from wrong in everything. I pray that God's richest blessing may rest upon you.

R. D., Elmbank.—I think Ethel can talk some better this year than she did last. She has improved a great deal this last two years. We examined her papers and think she did splendidly. The teachers must have great patience to contend with so many.

E. D., Garsfield.—I find James very much improved in every way, also his examination papers very satisfactory. I will always kindly remember you in your goodness towards him.

P. D., Ottawa.—I am glad to say that my son has improved since last year in all the branches taught by you in your Institution. I would like to know how he is getting on in his trade which I hope he will learn well. I would also like to know if he will be able to make his "First Communion" when he returns. I found that all his papers were very well written and in fact he has improved in all. Joseph sends his best respects to you and all his teachers.

Mrs. C. A. D., Dobbington.—After carefully looking over my son's examination papers I was very plesantly surprised at the remarkable progress he has made. The writing, punctuation and general carefulness are very well attended to and very few errors were made. He is gentlemanly and well behaved in his actions and manners. there being a marked improvement each year spent under your supervision.

A. D., Owen Sound.—We hardly know how to thank you for your kindness to our little Jessie, and we think she has wonderfully improved for she is a different girl altogether. By her papers she brings home we think she is getting along nicely and for the little of fancy work you have taught her I think it is very nice. We intend to send her as long as there is anything for her to learn if we can. Please accept our thanks for your kindness to her and we hope that God may spare you long in your good work.

Mrs. E. D., St. Catharines.—I am very much pleased with all you have done for my son Walter, but he seemed so silent when first he came home. He tries hard to speak the words I taught him last summer but he has lost them. Can there nothing be done for him?

J. D., Bracebridge.—I must tell you we are surprised how Archie has learned since he went down there, and I am sure we have a lot to thank you people for in taking such pains in teaching him and looking after him. He don't want to go back but the other two that live here want to go.

Mrs. D., Belleville.—I think both of my boys have improved greatly since going to the Institution, but hope that in the future there will be a still greater effort on their part to reach higher up in their work. I thank you and the teachers for what you have done for them in school, and I hope that teachers and scholars may come back, with renewed strength, to carry on that great work, which is a very profitable one now and forever.

S. J. D., Mono Mills.—My girl has greatly improved since going to the Institution. She seems to like the school and is quite anxious to go back.

Mrs. W. E., Fairbairn.—I do think Mabel is getting along very well. It is a wonder to every lady that sees her how nicely she can write. I do feel thankful to God that he ever provided such a fine place as the Institution for those who can't hear. I did think it was the hardest trial I ever had to part with Mabel when she went to the school but I feel that she is better taken care of there than at home. She is always ready to go back again. She is learning fast, she is very neat about her work and can do it good. I do not know how those who have deaf children can keep them at home when there is such a grand place as the Institution. I do think the teachers and all that have charge of the school are very kind. I would do most anything before I would keep Mabel at home. She can do fancy work nicely. She is learning faster than those who can hear.

W. E., Oil Springs.—I have examined Maggie's books and papers and she is doing excellently. Her religious training is excellent.

A. E., Markham.—We are well pleased to see that our children are getting along so well. We are glad there is such an improvement in Mary, and they are waiting for the time to come when they can meet with their old friends and teachers again.

A. E., Toronto.—We thank you for your faithful care over Stephen during last term. We find a wonderful improvement in many respects. Again I thank you for making such progress with our boy.

Mrs. L. F., Grimbsy.—I was much pleased with Beatrice's examination papers and think it is wonderful how much she has improved since first going to the Institution. I see an improvement each term in the use of the language, and that, to me, is the important feature. I remember getting a letter from her, I think the second summer she was at school, and it was so badly constructed it was a perfect enigma to me. I thought then it was next to impossible for her to ever get so far as to express her thoughts in appropriate language. But she has so far improved that we can talk by writing or the use of the manual alphabet nearly as well as though she could hear. I shall always feel grateful towards you and her teachers for the kindness shown to our

silent one during her severe illness, and the interest you have taken in her studies and general welfare. You are doing a grand and noble work in which I hope the Lord will always prosper you as he has in the past.

G. F., Tilsonburg.—We are much pleased with Ethel's examination papers. Her mental and slate arithmetic are very good, and, indeed, the same remark will apply to all her subjects, being alike creditable to herself and to her teachers. Her two sisters are able to converse with her quite readily.

L. F., Canifton.—I went over my daughter's papers and read them and I thought she had improved very much, and I am sure you and your staff of teachers deserve great credit. I can see improvement at the end of each term and I am sure you do everything you can for them, and I feel grateful to you and your Institution.

R. P. F., Elma.—I am sure Charlie has improved greatly, since attending the Institution, not only in reading and writing but in manners as well. I thank God there is a place where, though deprived of hearing, our children may be educated.

W. F., Tilsonburg.—When we look back and then see Charlie as he is at present we really wonder how anyone can regret sending their children to the Institution. We can now talk to him by hand and we show his examination papers with pride, to see how well he does We see a big improvement the past year, and he will return with love for his Institution studies. It is our earnest request that you accept our earnest prayers on behalf of your Institution.

F. F., Windsor.—We are well pleased with the way in which our daughter is getting along at school under the good management of the Institution. I feel very grateful to you and to the teachers for the kindness and care and trouble you have taken with her. I also feel grateful to our Government for making such good provision for the welfare of the silent ones of our country, and may God bless you and your staff and your Institution.

I. F., Casselman.—I can only and simply thank you for your tender care and services to my daughter.

A. G., Diamond —I think our little girl has improved very well for the short time she has been at the Institution, and she appears to have had the best of care. She is well and will like to go back.

E. G., Zurich.—I think Albert has improved greatly as he is smart and very active and his papers show that he is improving greatly. Whatever we cannot make out with him in the sign language we can always make out by writing. He has very moral ways about him and I am sure he receives the most kindly attention from you and all the teachers and officers. He is very willing to go back to school in September, and has been so every year. I think deaf mutes would be pretty helpless in this world without an education, and therefore we should be thankful for the Institution which furnishes the knowledge which is so useful to them.

O. G., Bracebridge.—Our daughter is doing well and you and your staff are entitled to great praise. She will return at the opening.

L. G. G., Berlin.—Dalton has made wonderful progress in his studies and mannerly conduct. I have looked over his examination papers and I see a marked improvement from one year ago. He is greatly pleased with the Institution and perfectly willing to return, which indicates to me your efforts for his general happiness and comfort has endeared him to the school and teachers.

C. W. G., Oakville.—We are indeed thankful that there exists such an Instituton, from which the deaf derive so much benefit. It is a priceless boon to those sorely afflicted ones, and truly what would life be to them if there did not exist such a place for their instruction and education. Their surroundings, while at the Institution, are such as are conducive to good health, comfort and happiness, a great deal more so, probably, in many cases, than would be found at home ; and the associations and ties of friendship formed there should, and I think will, ever remain fresh and green in the memory of those who have, and are, attending. Annie, we think, has improved wonderfully the past session. Her examination papers have been carefully looked over and were entirely satisfactory and pleasing. In fact I doubt if many of our High School pupils' papers are on a par with hers, that is for neatness and correctness. When I note all this my breast swells with pride of her ; and I truly thank the officers and teachers for what they have done for my child. We are well aware of the sound moral principles which pervade the Institution, and should the boys and girls turn out other than true men and women, a credit to themselves and a comfort to their parents, the fault cannot be said to be with the Institution.

C. G., Toronto.—Our children arrived home safe and I can assure you we are more than surprised at the way Violet has learned, and can say so many words. Willie has done real well but Violet has learned much faster than her brother. We cannot commence to express in words how grateful we are to you and your staff for our children, and also for the sound religious training they are getting.

S. G., Toronto.—I am very pleased to say my son has improved greatly the last term. I could hardly believe the examination papers he brought home were his, there was such an improvement I hope he will improve as much next term, then I think he would be able to earn his living and take care of himself anywhere.

J. J. H., Simcoe.—Frank being our only child we may have felt a little diffident about sending him at first as he was under seven years of age. After visiting the Institution and seeing for myself how things were I came to the conclusion that no person any way connected with the Institution could live there without a love for the deaf It would be impossible for the average school teacher to do so. I would advise any person sending a child for the first time to visit the Institution and see how well the children are cared for. I am not surprised that the children want to go back after the holidays, or even after being away for three or four years.

E. B. H., Ottawa.—I have examined Gertie's exercises and have been pleased to notice considerable improvement, and we endeavor to let her know it.

Mrs. H. H., Talbotville.—I am pleased to say that I notice a great improvement in Annie each year. She seems to get along very well, and to be happy at the Institution. I feel I can never thank you enough for the interest in and the care you have taken of the welfare of your pupils.

T. H., Bolton.—We think Clara has improved wonderfully during the time she was at school. I don't think if she had her hearing that she could have learned more in the same time. The examination papers are neat and clean and far excel our expectations.

H. H., Ottawa.—I find my son, Honoré to have made big improvements at the Institution and we are well pleased with the work he has done. He speaks of you every day and seems to linger for the time to go back. I thank you very much far your kindness towards all the pupils and towards my own son.

T. H , Homewood.—We are very much pleased to find that Felicia has so much improved during the past session, and we sincerely thank you for all your kind attention to her.

Mrs. O. J., Tynside.—I feel we are a great deal more indebted to you than we will ever be able to pay for your great kindness and careful attention to our little daughter. She is happy and likes her teachers. We do feel so thankful to God for the good health she has enjoyed. Not one of our family at home has escaped a serious sickness of la grippe lately, and she would not have missed it if she had been here, and that is why we feel like thanking you all more than pen can describe for your kind care to our own helpless child.

O. L. J., Tynside.—I feel very grateful to you for letting our dear little girl write so often, and so happy that she is doing so well. It seems hardly possible that she can write so good. We all have great reason to praise God for the good health of your school, as sickness has been such a constant visitor all around here.

A. J., Toronto.—I am very much pleased with Arthur's progress at school, but I don't think he has improved so much this last year as he has done in previous years. He has never shown as high marks as he has done previous years if that is anything to go by, but I think, altogether, his progress will compare favorably with that of boys who can speak and hear, who are attending public schools, and his mother and I are pleased to see him do so well.

J. H., Milford.—I was more than pleased with my boy's improvement. If you had told me when I first sent my boy to the Institution that he would make such progress I should have doubted, for I could not have believed a person like him could be taught to write and be such a manly boy. You and all the officers and teachers have my heartiest thanks.

Mrs. J., Tynside.—I wish to tell you how much delighted we were to see our little girl so much improved, and we feel doubly paid for the sacrifice. We could not have credited it if we had not seen what she has learned. Her examination papers are wonderful, and the best of all is we know she will talk. She can say so many words. When I put her little sister's names, she had never known, on paper, she spoke them, and our minister came here one day and he could not understand how you could have taught her so much in the time you did. He put his name on paper and she spoke it at once, and he seemed amazed. She is so changed in her disposition. She is quiet and so mild to what she was. Some days she takes a notion to write, and will write nearly all day. She will read for her friends when they come to see her, and sign "Nearer my God to Thee." We do feel so grateful to you and all who have taken such good care of her and treated her with so much kindness. May God prosper you and your good works.

Mrs. M. J., Kilbride.—I think my little girl's improvement is just wonderful. I have examined her writing and spelling and have tried her in every way that was in my power to see what she had learned and I find she is almost as far advanced in her studies as [my daughter of

14. I find she is very determined and headstrong, and I have had to be quite strict with her to make her do as I wish, I can see she has been used to kindness and love, and not only is she advanced in her studies, but her everyday behavior and manners are a credit to her superintendent and teachers. Oh! what care and trouble you must have taken, what patience and kindness on your part! She is an example to her sisters; her habits of cleanliness and tidiness put me to shame. When I think of the number of poor little afflicted ones you have to look after, and not one thing that is for their good left undone, I think we mothers ought to be ashamed of ourselves. I cannot express my gratitude to you and your noble staff for your kindness and attention to my child. May God bless you and reward you all for your noble work, for it is one of the noblest works that can be done for humanity.

Mrs. J., Bracebridge.—I am very much pleased with what Louis has learned. I feel very well satisfied with him. He wants to go back.

G. J., Bobcaygeon.—We are well pleased with the progress Ida has made and the attention that was paid her last year in particular. She is very anxious to go back to school to finish her education. Mary received an education there she could not have got elsewhere, and we are well pleased with you and thank you for your kindness.

P. K., Bancroft.—I cannot get Matt to go back to the Institution this term. I have done all I can to induce him to go back, but he will not go.

Mrs. M. K., Brechin.—I am very much pleased and thankful to all the industrious good people of the Institution for their good care and kindness to my little boy. It is surprising to neighbors and friends how he has improved since last vacation. His examination papers have been sent to New York and his aunt could not believe he could be taught in so short a time. He only wishes for the 15th of September.

Mrs. N. E. K., Kingsville.—Vesta did not appear to get along as well as I could wish, but I do not blame her instructors in the least.

J. K., South Lancaster.—I got people who could read them to examine my boy's papers, and they all join in saying that he cannot do better, and some of the leading people of this place give the Institution great credit for the progress he has made, both in learning and manners. I have heard of three deaf people out at North Lancaster, and I will try and find their address and send it to you. I am very thankful to you for all you have done for my boy.

D. L., Ottawa.—I send you my thanks for what you have done for my little boy, and every day I pray God for you, for it is a great work you are doing, and God will reward you for it.

H. L., Cherrybank.—You have been so generous in your kindness to my poor boy that I feel I cannot thank you enough.

A. L., Port Albert.—I feel very grateful to you and all the teachers connected with the Institution for all you have done for my daughter.

J. L., Hopeville.—We find Fleury much more gentlemanly and courteous in behavior, and also he can imitate or make all the letters quite quickly, detecting at a glance if ours are not correct. We do hope he may learn, and we do pray the Almighty Father to bless your Institution and all connected therewith.

J. L., Mildmay.—My little boy has learned wonderful for the year he has been at the Institution. The Sisters from the Separate School and many others in town examined him and asked him about his lessons, and they all expressed their wonder at his progress. He wants to return when school opens. Very many thanks for what you have done for him.

G. A. L., Windsor.—I think my little girl is doing very well, and I am much pleased to see her getting on so well. I feel very thankful to you all for your kindness towards her.

J. S., Drysdale.—We must say that our little boy has improved wonderfully, and he speaks highly of the treatment he gets at the Institution, and how kind the Superintendent and his teacher is to him, and the way he is brought up to say his prayers is a credit to the Institution. May the Almighty God bless you and continue to help you to care for the little ones as well as you have in the past.

G. W. L., Peterborough.—I think that my son has improved a great deal during the last term, and I am perfectly satisfied that no more pains could be taken towards his benefit than you have taken to make him learn that which would be a benefit to him, and I thank you very much for your kindness.

Mrs. E. L., Bridgewater.—I do not know how to be thankful enough to you and to all in the Institution for your kindness to my little boy, and I hope that my prayers to God will be heard for you and them that take care of him. He has improved a great deal since last summer. I hope you will teach him a trade of some kind.

N. L., Ottawa. —I am very well satisfied with my daughter. She has improved all I could have expected, and she always has a good word of praise for the Institution and her teachers. We have found improvement in her conduct and ways. She is neat and tidy, and we are proud of her.

Mrs. M. L., Toronto.—I am very thankful to say that my boy is much improved in every way. He can talk much better and writes better than the one next in age to him, who has been at school several terms. He is looking forward with pleasure to going back to school at the end of the holidays.

A L., Port Albert.—It is a great comfort to us all to have our daughter so nicely educated, as we never expected when she first went to school that she could gain so much knowledge. I have noticed each year a very great improvement in her examination papers, which speaks highly for your noble Institution, yourself, and all the officers and teachers connected. I truly hope you will each be spared many years to carry on your good work.

G. W. L., Kent Bridge.—I think my boy has improved the past year very fast, and I must congratulate you and the teachers on his success.

J. L., St. Albert.—We are glad to see Maxime improving so much in his studies. He has done better this year than last. We would like him to learn a trade next term.

Mrs. M. L., Listowel.—I am well satisfied with my son's progress. I sincerely hope that the blessing of God may rest upon the Institution, for what would I have done with my deficient child had it not been for that Institution.

Mrs. M., Renfrew.—I am delighted with the progress Walter is making in talking and in his studies.

T. M., Fargo.—We are greatly pleased with the progress Nellie is making in school. When I think of how she would have had to go through life if it had not been for your Institution, and how bright the prospect now is, where all would have been so very dark, it makes me feel thankful to the Government that built such an Institution, and also to the officers and teachers that manage the same. Misses Mabel and Fanny B. are here on a visit. We had a lawn social the other evening and the three girls recited, in the sign language, "Nearer My God to Thee." It was a wonder to a great many, as few of the audience had ever seen the sign language before, and it brought forth some very fitting and complimentary remarks from some of the speakers towards the Deaf and Dumb Institution and its officers.

J. M., Kinghurst.—Lily has improved in more ways than one. She is farther advanced than we thought she would be. She shows her papers to every one that comes in and they all say they are a credit to her and to the school. She hadn't a blot or a mark on any of her books and they are written so nice. Indeed we are proud of her.

H. H. M., Osceola.—We feel thankful to you that Rose Ann was enabled to continue throughout the session. That she has improved is evident from the papers she brought home, which we find very satisfactory. Great care has been taken to mark every mistake, what we might have looked upon as a trifling slip. But, if these small mistakes are allowed to pass greater ones will follow. We are glad also to note the improvement in domestic duties; and last, but not least, something that gives me no little amount of joy and pleasure to speak about is the spiritual improvement of my child. I am sure it must rejoice your hearts and strengthen your hands to know that the efforts put forth by all, not only to make the children happy and comfortable, but also to instil within them sound moral principles, are not without fruit.

J. M., Ridgetown.—We must say that our son Maxwell has improved very much in good manners, general knowledge and in his studies, for which we are grateful.

Mrs. A. M., Peterborough.—My boy looks so well this year and has improved so much in learning. His examination papers are excellent. Everybody that sees them is surprised to see how well he can write. I am sure your labor is worth more than I can tell and I am very thankful to you and to the teachers.

H. S. M., Jarvis.—I think my boy has improved wonderful. I think it would be a great benefit for him to go another term at least; he has, the last two years, done excellent.

J. M., Eau Claire.—My boy has improved very much this last term. It is needless to say that we are thankful to you for all the pains you have taken with him. We could not find words to express our gratitude to you and to the teachers who have taken so much pains to instruct him in both temporal and spiritual matters.

Mrs. A. J. M., Forest.—I thank you for all the care you have taken of George the past four terms. I examined his papers and think he has improved very much under your care, and I am sure that you have done all in your power to aid him in learning. I hope God will bless your efforts in the future as He has in the past.

Mrs. J. M., Lanark.—We think Thomas has improved well in his learning and we thank you kindly for the interest you all have taken in him and for the mannerly way he has been taught. We never expected to see him such a bright and kind boy. We again wish to thank you from the depths of our grateful hearts for the love shown to our dear son, and we shall ever pray God to bless you all and to enable you still to discharge your duties.

Mrs. S. M., Wychwood.—I examined my boy's examination papers and was surprised, as was every person that saw them, at their correctness. I think he has done remarkably well. I think we should feel thankful to God to have such a place to send them, and also to the teachers for the kind interest they take in them, not only as to their education, but their behavior also, which is an example to hearing people.

Mrs. S. M., Brooke.—I am sure my son's progress has been very great. Even his manner shows his good training. All who know him pass remarks on his good manners. We examined his papers and find that he has improved greatly from last year.

Mrs. G. M., Lady Bank.—We are all well pleased with Mary's progress, she is doing well. She is doing better than the other two boys that have been to school longer than she has. Mary loves her teacher, she gets her picture and kisses it. She likes to go back to the Institution. May God rest and abide with you and yours forever, and may He bless the Institution.

M. M., Elmstead.—I am very glad that my son has improved so in the short time he has been at the Institution. He will be glad to go back again this fall.

J. M., Pembroke.—The children have learned very much better this year and they are studying well at home. They are anxious to go back again.

Mrs. M., Toronto.—Jane likes to be at school very much, she has improved greatly this last term. We were surprised to see her writing and her books the way she was improving. She loves her teacher, who must be very kind to her.

W. M., Hamilton.—Jane has made some progress but it is not so good as it should be, but it is no fault of her teacher. I am sure in time she will improve better. She seems to be very fond of writing since she came home, and she is constantly assisting her mother in the house-work. In fact she is never idle, but finds something to do about the house, which shows what she has been taught at the Institution. My wife is awfully thankful to you and the officers and teachers of the Institution, for the good care that was taken of her since she went there.

G. M., Tavistock.—I looked over their papers carefully and we are very much pleased with the progress our children are making. I showed the papers to some of my friends and they say they can write better than their children, who have been going to the public schools here for seven years. We are very thankful to you for your kindness to them while under your care.

T. M., Westmeath.—We are pleased with the instruction Hamilton has received at the Institution, both in training and education. I think he has improved more this last year than any year yet.

J. M., Kinburn.—We have made up our minds not to send Annie Jane back to school any more, and she does not want to come. I think she has a pretty fair education. We thank you very kindly for your kind treatment of her during the past seven years.

Mrs. R. M., Everton.—Robbie arrived home looking much more hardy than he used to do. We consider him much more improved in every way. I tremble to think what our child would have been without an education. Hard as it was to part with him, we see the good, in a measure, in a short time. He helps with the work outside as well as in the house, much more than he used to do. We are truly grateful to you and those who have cared for our child.

Mrs. M., Toronto.—We are all well pleased with the progress my daughters have made, and I am thankful to you all for all your kindness to them, also to those whose care they were under.

Mrs. J. N., Portland.—The education Joseph and Agnes have received at the institution has, I must say, been of great benefit to them in life. It assists them in many ways. They are brighter and more intelligent, and seem to take more interest in everything. Joseph thinks if he could spend one more term at school he would be greatly benefited.

P. N., Harper.—I am indeed very highly pleased with the progress Maggie has made in her studies during the past year, as shown by her examination papers which she brought home with her from the Institution, and her mother and myself are indeed grateful for the kind attention and pains bestowed upon her education by the devoted teachers of the Institution. Allow me to thank you sincerely for the kindly interest which you have ever shown in behalf of my children, and to add my testimony to that of thousands of others in praise of the good work done by the Deaf and Dumb Institution of Belleville. Maggie will return to Belleville in September, Matilda and Emily intend opening a sewing room in Perth, and Michael has a good position in the C.P.R. car shops in Perth.

J. N., Kinlough.—We feel very much pleased with the progress Bertha has made since her attendance at the institution, but feel sorry we did not get her with you a couple of years before. Her love for the institution and for the teachers and all connected with it is sufficient evidence of the kindness with which she has been treated while there. She feels anxious to get back. You will please accept our thanks to yourself, your teachers and all connected with the institution for the kindness shown her.

Mrs. W. P., Delhi.—Cora is doing well in her studies, but she is so spunky we can hardly get along with her, and she don't want to work or do anything I ask her to do.

Mrs. W. P., Peterborough.—I was very much pleased indeed, with Gertie's examination papers. I think she has improved very much since last term. I feel sure that you and her teacher have taken a great interest in her. She says she will be glad to go home again, as she calls the institution.

H. P., Staffa.—We are astonished at the progress Murray has made in every way. He is a very different boy from what he was when he went away. He is much quieter and more easily managed. We looked over his papers and it is remarkable that he should be able to do so well. He has not made a single complaint about the school, and is glad to know he is going back again. He speaks very kindly of his teacher, and of all the officers of the institution, but is particularly attached to yourself. He told us of the good care he received while he was sick, saying he was taken care of there better than at home. Please accept our sincere thanks for your kind care of our boy.

Mrs. O., Haliburton.—We think Charlie has improved wonderfully since he has been at school. We were surprised to see how nice his examination papers were. He doesn't want to go back to school any more. I thank you for all your kindness to him.

J. P., Rockland.—I think my boy has improved wonderfully. I couldn't think it possible for him to do as well as he has done. He is asking every day when he is going back to school.

W. O., Milverton.—James has improved greatly the last year, both in his studies and manners. We could not imagine that a child like him could learn so much in four terms. I am sure that there are good patient teachers or they could not accomplish what they do. James speaks well of his school and of the kindness he receives while there. Our hearts go out in gratitude to God for all His mercies, and to you and to all the teachers that are under you. May God bless your labors as he is doing now and reward you in Heaven.

W. H. O., Wilberforce.—I cannot express my gratitude to you and the teachers for the kindness you have always shown to Orval. He always writes how well he likes it at school and is always ready to go back. I am well satisfied with the progress he has made. He may not be as quick to learn as some. I feel very grateful that he is allowed to come back again for a longer term, as I see by his examination papers that he is a long way from being as far advanced as I would wish him. He is a good boy at home, and has taken a man's place in the harvest field. I can see that he has improved in speaking.

L. O., Shipley.—I am well pleased with my girl and she has much improved, as I see in her examination papers, for they are so neat and clean.

W. S. P., London.—I can assure you that there is a great improvement in George this last year I am also glad to be able to state that he is willing, and I may say eager, to return to school when the time comes to do so. It is a great consolation to myself and his mother to know that he is doing so well as he is at school and to know that he is kindly treated, and if sick, that he is well taken care of. It is a grand thing to have an Institution for the deaf to send them to. By what my boy tells me, I am sure that they are all well treated, better, I am satisfied, than I could treat my boy at home in a large family of speaking children.

J. W. P., Davenport.—My boy's examination papers have been carefully examined and we think he has done splendidly. The progress made in the past session is much better than we expected. I thank you and your staff for your attention to him.

J. R., Castleton.—Jessie, I think has improved in writing and spelling. We talk to her the same as we do ourselves at home and I think she has learned to talk a great deal better than she did last year, and the more we speak to her the better she seems to improve.

C. R., New Hamburg.—I examined Edwin's papers and I think they are number one. I think you and the teacher deserve praise for the work you did through the past year. I am very well satisfied with my child and never expected him to improve as much as he has done.

Mrs. C. B. Q., Pelee Island.—We see such a change in Angus for the better. We are so thankful we live in a time when there is such a school for the deaf. We have read his papers with pride, he has made such progress in two years. I am sure it must take a great deal of patience to teach them. He wants to go back this fall. I am surprised at his clothes lasting so

long, and the care taken of them, just as good as if he was at home. We expected a call for shoes but none came. How do you make them take such care of them? We think they are extra good shoes from your shoe shop. As for the religious training, it does us good to see that not passed by but better given than could be given at home He always did kneel with his brother at the bedside before going to bed but could say no prayer, I with my hand on his bowed head praying for him. But thanks to God, through some one at school, he knows how to pray. It makes me weep for joy. He is very careful what he does, on Sunday particularly. He asks such questions as "Is it a sin to kill flies?" I think his teaching has been thorough. He is good to mind what he is told. I send my kind regards and good wishes to all who have taken an interest in our boy. God bless you all in your good work is the prayer of a thankful mother.

Mrs. M, S., Kintore.—I think my daughter has improved very much this last two or three terms in reading, writing and sewing. I think she should improve more in conversation than she does. We write questions on a slate and she doesn't seem to answer them.

Mrs. G R., Pembroke.—Mary declares she will not go back to school next year but of course I will take her back. She is a grand girl at home this year, greatly improved in her manners and studies. She has made good progress.

W. R., Emerald.—I am very pleased to see such an improvement in my boy's studies each year. This year he is very much smarter and more clever than he was last year. I cannot express my thanks to you and to all the teachers for what you have done for my child.

T. H. R., Fenelon Falls.—I think Emma has improved very well. As far as her examination papers are concerned I think she has done remarkably well. She is also clever in figures, seldom making a mistake. I have shown the papers to others and they say that they are well written, showing that the Institution is a credit to our country. Emma is pretty rough at times, although nothing like what she used to be.

Mrs. J. R., Ailsa Craig.—I am well pleased with Mary's progress in her studies while under your care, and thank you for the interest you take in her.

A. R., Dunnville.—I think Rosetta has improved splendidly.

Mrs. J. R., Ayr.—I have looked over Eleanor's examination papers and there is a big improvement since last year. She has done very well considering the amount of sickness she has had.

Mrs. R. R., Kinmount.—I am well pleased with my boy's learning. I think you and the teachers have done your duty with him and any other of the children I have seen, and I am thankful to you all for your goodness to him. It is a great thing to be able to understand and know what he wants. I don't have the trouble now to find out like I used to have. There is a great improvement since the first time he went.

J. R., Paris.—We have examined Robbie's papers and find the result of his year's study very satisfactory, better, indeed, than we had dared hope. In great institutions like that of which you are the head, there is a tendency towards boys becoming rude, but we find Robbie a perfect little gentleman, and we cannot thank you enough for your kind care of him. You have my hearty sympathy in your great work.

A F. S., Acton.—It is seldom that I write you, the simple reason being that all of us feel perfectly satisfied that our child is well cared for by yourself and your staff of teachers and officers. I know that my child is better cared for there than she could be at home.

Mrs. J. S., Weston.—We are well pleased with Annie's improvement. We always look over her examinationn paper as soon as she comes home and we are will pleased with it I am more than thankful that I have sent her to your school for I am sure that she is well cared for. Annie loves her school, she says they are good to her and she is quite happy to go back when school opens every year.

L. S, Roblin —I am well pleased with the way in which my boys are improving and with the good manners they are learning. My neighbors think it is wonderful how they have learned. I thank you for this improvement and for the kind treatment they have received at your hands.

Mrs. W. H. S., Aylmer.—We have gone over all Lloyd's examination papers and we find a great improvement indeed. I am so thankful he is improving so well, and we also thank you and all the teachers for your kindness to him.

Mrs. H. S., Forest.—I have looked over Percy's examination papers and there is a marked improvement in all his work, and he can talk very much better than he could. He speaks his words much more distinctly and more of them than he did. He seem a very good boy in most respects, although he does not care to work much. I do not know what the poor deaf-mutes would do but for the institution. I thank you all for your kindness and care to the boy, and may God bless you and all connected with the Institution.

Mrs. T. S., Piperville.—On his arrival home I found my son improved very much in every way. His health also has greatly improved. I am very thankful to you for your great care over him.

J. S., Berlin.—We have looked Albert's examination papers over with admiration, and everybody that sees them is surprised to see how much he is improving every year. I thank you for your tender and kind care of the children.

J. S., Moray.—We are well pleased with the progress my daughter is making. We would like her to learn some trade.

J. S., Petersburg.—Catharine made good improvement while she was at school, and I think you have done your best to give her a good education. I think she will not go to school again. She has been there eight terms and she doesn't like to go back. I would like to send her another term but my wife is not in good health, and I thought she is old enough to help a little. I send you many thanks for all your kindness to Catharine and the good care you have taken of her.

A. F. S., Acton.—I must say that I am exceedingly well pleased with the progress my daughter has made under your care and teaching. I have carefully looked over her examination papers and I am really more than pleased to tell you that I believe there are a few hearing children of her age that are so far advanced. She came home in perfect good health and looking so happy. If all your pupils have as kind regards for you as Maggie has, which I believe they have, I am sure you must be a happy man. I am satisfied that my child is better cared for with you than she could be at home. I thank you for your kind and loving care ; also your staff of officers and teachers, which I believe has no equal.

Mrs M. S., Shetland.—We think our children are improving fast. We hope they will improve as much next year.

Mrs. W. T., Salem.—Margaret has improved but a very little for her time in Belleville. She can write the names of some things in the house and that is about all.

J. T., Dundas.—I am very anxious to let you know that I and every person who has seen my little boy is pleased and surprised to see how nice and gentle he is, and so much improved in every way. I did not think he would be so far on in so short a time. He writes his name so well and all his books and papers are very nice. I thank you very much, also his teacher, for your kindness to him. Our Parish Priest is much pleased with Joseph too.

W. H. T., Orillia.—I think there has been a very marked improvement in Laura in every way. In her actions she is now more like a grown person than a child, and the fact that she is able to converse on her hands and on paper with such proficiency, considering the short time she was under your care, shows the amount of careful and painstaking attention she has received. I also beg to thank you for placing her, so young a pupil, in the articulation class, and I am glad to report her being able to pronounce quite a number of words with tolerable accuracy. I may say that she is looking forward with pleasure to the time of her return to Belleville.

C. N. T., Niagara Falls.—We are more than surprised at the progress Harold has made. We expected great things, but far greater than our expectation was the realization. How it has been done is a mystery. We can't say more. We wish you and all connected with the Institution every success in life and added blessings hereafter, and extend to any one of the staff a hearty invitation to call on us if ever at Niagara Falls.

Mrs. T., Toronto.—I do most heartily thank you for your great kindness to Maud and I shall be more than pleased to send her back on the 15th of September. I consider her very much improved in every way. She is a good girl and is trying her very best. She seems pleased to help in every way she can.

W. T., Dungannon.—I never saw my little girls look better than when they came home from school, and I think they are getting along very well. I was glad to hear that Mabel is going back, I think it will be a good thing for her. The two little girls, I think, have done very well. I had our minister looking at their examination papers, and he was very well pleased with them, and he thinks they are getting along fine. Mabel has done very well, too, but we think there is room for a little improvement ; but it is more than I know, and a good many more, how you get them brought forward the way you do and get them to understand all you have to teach them. They always have spoken highly of their teachers.

W. T., Toronto.—I am greatly pleased with the progress my boy made last term, judging from his examination papers. I feel very grateful to you for your kind, paternal care of my boy during his stay at the Institution.

E. C. T., Pembroke.—John is well and is at work at his lessons every day. My youngest girl helps him along. I examined his papers and was much pleased with his improvement. I am well satisfied for he did splendid. He wants to go back to the school every day.

M. V., Bancroft.—I have been looking over my boy's papers and I cannot express my surprise and thanks for the improvement he has made. I feel sure you have done your best to instil in his mind good principles, and I feel he is a credit to us and hope he will prove so to you. I am very thankful to you for clothing him so comfortable, as I was not able to send him any clothes.

Mrs. V., Spence.—Our children have greatly improved in their lessons and studies. We are very much indebted to you for the care you took of Elizabeth when she was sick.

Mr. W., Guelph.—Willie had intended going back to school, but two or three weeks before vacation was over, a friend who works in Milton in the shoe factory told Willie he could get him a job so he went down there and started to work. He seems quite contented and likes his work so he did not want to go back to school when he got started to work. We hope he will prosper, and we will have to thank you for it. I am sure we feel very grateful to you and all the teachers who were so kind to our two children.

A. W., Castleton.—We think Henry has improved greatly. In looking over his examination papers we can see he is improving all the time. We are very thankful to you for your kindness toward our son while at school.

Mrs. A. W., Queensville.—I am very much pleased the way Francis is getting along, for which I am thankful to you and to his teachers. I trust that he may grow up and be a credit to the Institution and a help to me. I especially thank you for the kind interest you have taken in our welfare.

R. W , Marmora.—We think Edith has a fine education, and also is handy with all kinds of work. We find her a great help at home, and we are indebted alone to you and your noble staff of officers and teachers Our earnest prayer is that God will bless and prosper you and your noble Institution and that you may live long to rule over deaf children. Edith often tells us how noble and kind you have been to the deaf.

W. W. W., Wexford.—We are pleased that Allan is getting on so well, in fact far better than we expected he would this year. He reads a great deal and seems to want nothing else to do but to learn, or be into mischief. I think if he continues to do as well the length of his term he will have a good learning, thanks to your system of teaching.

W. W., Dundas.—We examined Bessie's papers and were well pleased with what she wrote. We think she has improved greatly within the last term. She has improved in her speech. We thank you kindly for your great kindness and would be pleased to have you call were you ever in this neighborhood.

A. J. W., Creemore.—My sister has improved very much since she went to the Institution. It is a grand thing that such an Institution was opened for the deaf, and I am sure the children are well cared for.

W. W., Bothwell.—We feel proud of the way our boy has improved in the way of education and also in his manners. I did not expect he would gain so much in so short a time as we were not able to teach him at home.

Mrs. T. W., Chatham.—I thank you for your attention towards my boy. I think he has improved greatly. It bothers me very much because I cannot understand or learn the deaf and dumb letters.

J. W., Coboconk.—My boy tore his papers up, not knowing they were of any value. He has improved exceeding well in writing, but I have no way of judging of his improvement in other ways. Of course I notice that his moral training has been excellent, and I am sure you have my heartfelt thanks for the kind and generous manner in which he has been treated since entering your Institution.

Mrs. F. W., Portsmouth.—David arrived home safe, and we found him much improved and in the best of health. We sincerely thank you for the interest you have taken in our son's welfare. We also thank his teacher and everyone that had a care over him.

Mrs. S. W., Orillia.—In looking over Lillie's papers I notice some that are very good and others not so good. Lillie will go back in September, and I would like her to get all the education she can. She has improved a great deal since she went to the Institution.

S. H. W., Niagara Falls.—It is with pleasure and thankfulness I address you in regard to my boy. He reached home safe and in good health. I have examined his papers and I feel quite satisfied with the same and hope that next term he will do still better. He likes kindness, which I am satisfied that he gets while under your care. I wish you every success in your great work, and thank you for your kind attention to my son.

Mrs. J. W., Wyevale.—We are well pleased with the way my child has been taught in every way. Her examination papers are pleasing so far as we understand them, and we appreciate

your offer to allow her to occupy her time the next term in the sewing room. The Institution has been a grand blessing to my dear child, and I can never be thankful enough to you and to God for placing here such a means for her education, and such a great help in making her useful, too.

A. W., Toronto.—We think Marion has improved wonderfully. It is a trial to have her away from home, but we are more than pleased with the improvement in her. We never thought she would be able to read and write so well, after only three terms at school. I am sure that they have the best possible care. Mr. W. was quite pleased and satisfied with all he saw at the institution at Christmas. We are sure Marion is happy and comfortable at school, she speaks so cheerfully about going back.

A. Y., Brookfield.—I think Sarah has improved very much this last term, and she says she wants to go back to school. There are a good many things that we cannot make her understand, so I think it would be well for her to go another term. I pray that God will bless the good work at the Institution.

W. J. Y., Madoc.—In looking over George's examination papers we feel that all has been done that could be done for him. We see quite an improvement during the last term; We are pleased to tell you that through your good management in his behalf, he makes friends everywhere he goes, for he is obedient and a good worker.

Mrs. H. Z., Palgrave.—We have looked over John's examination papers and find a great change from last year. I feel very thankful, indeed, to see that he is getting along so well. I often think what a grand institution it is. We have shown his papers to a great many people and they think it is wonderful how much he has learned in so short a term. In regard to our little girl, we have talked the matter over and have made up our minds to wait another year before sending her She is only seven years old and a very bright girl. I thank you for your kindness to my boy and send my best wishes to you and the teachers and officers.

M. B., Udora.—Letitia learned well at the Institution and the education she got was of great advantage to her. She always speaks well of the kindness she received.

J. B., Carlton West.—We have examined Thomas' papers carefully and he is improving well. He is learning to read and write well. It has been a good thing for him, for going to the Institution was the best thing he ever did. Thomas G. says you have all been very good to him and did your best to teach him. He is learning to be a good boy in all things and in all ways and attends his church well. He is longing for the time for him to go back to school again. He doesn't like being out in the country at all, all his mind is for school. He says he has good times at school.

S. C., Eglinton.—I am happy to tell you that I am well satisfied with Freddy's school work and with his moral ideas so far as he knows. His general deportment is all that I can reasonably expect. I am thankful to the Giver of all good that He inclines so many noble men and women to devote their time and talents to the instruction, happiness and welfare of the dear silent ones. May you and your valued helpers long be spared to continue your self-denying work.

Mrs. T. C., Hampton.—I am thankful to say that Herbert is greatly improved and seems to be a fair scholar. I would send him back another term but he does not seem to care to go back. I thank you very much for your kindness and I wish you every success. I am pleased that there is an Institution for the deaf and dumb. I cannot find words to express my gratitude to you for your kindness to my boy.

Mrs. D., Peterborough.—I send my deepest gratitude to you and all your assistants for all their care and kindness shown my child since she has come under your care, and also for the way she is progressing. It is beyond my expectations, she has improved in every way. Before she went to your school I had almost given up hope for her. I was afraid she would not settle down and be contented, but I find I was mistaken for when home she longs for school to re-open She is so changed in her manner, so gentle and kind to everybody.

Mrs. C. F., Chatham.—I received John's diploma and cannot find words to express the gratitude of my heart for your unceasing love and care for my son. He is now working at Tilbury with Mr. M. He is getting along very nicely at typesetting and is learning job work.

L. G , Pendleton.—My boy arrived home safe and we never saw him so fat. We find that he has improved a good deal, and not only us say it, mostly everybody that come to the shop. I show them his examination papers and they say they have children that have gone to school for six years and cannot do as well, and we have a good public school. You's must have terrible good ways for teaching. I can tell you that I am well pleased, I never expected he would learn so much in so short a time.

F. H., Rockport.—My son is at work every day sodding a lawn for Mr K. at $1.50 a day. He is a steady young man and has worked for Mr. Skinner all summer at $1.50 a day. He sends his kind love to you all. May God grant you good health and many happy years in your good work.

W. J , Red Deer, N.W.T.—As no arrangements have been made to take deaf children from the North West to the Manitoba school, Robert is no farther advanced than when he left your school. We were very sorry about him not getting his education finished. Robert is a good boy and his parents feel very thankful to your officers and teachers for the kindness bestowed upon him while he was at your school, and we are sure, if he had remained with you a few more years he would have been able to fill a situation equal to many speaking boys. I wish to express my gratitude to you and all at your Institution for the care bestowed on my child both in sickness and health as well as in education.

M. W., Stouffville.—Maggie has not had very good health the past five years, but she seems perfectly happy and endures all her sufferings with great patience. The Institution did her a great deal of good and we are only sorry she did not attend longer.

H. S., New York.—Evan is not quite so merry as he used to be but he is a very good child, kind and obedient and I have no fear that he will not make good progress. I have a great deal to thank you for and all his teachers while in your Institution and I will always take a deep interest in his first school.

E. J. K., Crediton.—My sister is not capable of writing a letter. She does quite a little house work and is fond of knitting. She learned some very pretty patterns while attending the Belleville Institution. I often feel very sorry that my sister cannot express her thoughts in writing. Life would, I think, be so much brighter for her. It would give me great pleasure had she been able to answer your letter, but as it is you will please excuse her.

Mrs. J. B , Peabody.—We are much pleased with the progress our children have made in their studies. We can notice a marked improvement since they went away last fall. I do not think I shall send Annie this term, she is not much more than seven. I shall try to send Mary and Sarah back.

R. R., Jarvis.—I am surprised at the progress my son Herbert has made since going to the Institution I think another year's schooling would be of great benefit to him. He is a good man on the farm, strong and willing, and able to put his hand to almost anything. I thank you for your kindness to him.

J. W., Junetown.—Ira is enjoying good health and is at work on the farm at home. We do know that the instructions he got at the Institution was a great benefit to him. He often reminds us of Belleville and seems to remember everything that happened when he was there. It certainly was a blessing to him, only it is too bad he did not start earlier in life as he would have learned so much more.

Mrs. and Mr. L. E. S., Walkerton and Niagara.—Your very kind letter to us *re* Johnnie's articulation progress gave us a rather severe attack of the "blues" at first, for, of course, with all the ambition of parents for an only child, we had hoped he would do a little extra well. However, when we looked at the matter reasonably and knew how he had been threatened with entire loss of intellect, we could not be sufficiently thankful to God and to you and the teachers under Him for the progress and development our boy was making. I know he has had the very best teachers each year while with you, and have always wondered at, yet been so thankful for, such kind considerateness. We can see now how articulation is not of primary importance, though we had hoped for proficiency in that line; yet, if possible, we would like him to retain what he has. It was very sweet one night during the holidays, when putting him to bed, to have him put his arms around my neck and whisper "My mamma is the loveliest lady on earth." We are so glad he is well, he writes us such quaint letters and cards. His good health during the year is a cause of great thankfulness. It was quite a while before I could reconcile myself to "my baby" being in the printing office, and yet all the time I felt perfect confidence in your judgment in doing the best thing for him. He is growing so fast I thought he needed all the outdoor air he could get, but he seems to be quite well and is very proud of being a "printer's devil," as he calls it. Johnnie's letters show improvement and a manliness that is very gratifying. His examination papers were perused carefully by his mother and myself, and shown to many visitors during the summer. We have commended our boy over his success and we feel grateful indeed for his progress in the ordinary branches of an English education. In articulation and lip reading though, if we can judge, he has for two years seriously retrograded.

S. C. Eglinton.—It has been a great pleasure to us to have had Freddy home for three months. We are truly thankful that he is doing so well and that he is very fond of his school.

Mrs. W., Creemore.—I am very glad to hear my daughter arrived safe. She felt very bad in leaving home but I know you all will be kind to her. I am sure you have been very kind in the past and I thank you for it. I am very glad to see the way she has improved since she started, and I am sure you have taken great pains with her.

T. H. P., Woodstock.—Our boy has made wonderful improvement since going to the Institution and we are very much pleased with the manner in which he has been taken care of while there. He speaks very highly of all the teachers and is always ready to go back to school again when the time comes. I thank you for all your kindness to him.

T. B., Sarnia.—We don't know how to thank you for all your kindness to Tommy. We were so proud of him when he was at home, he was so manly, thanks to you and your teachers. He was pleased to go back but he did not like to leave us. He liked you all at the school. We are very lonesome at home without him but we know it is for his own good.

R. C., Hilton.—We are well pleased with Lizzie's education. She has improved greatly this last season and I hope she may continue to do so. It has always been my wish for her to be obedient to you so that she may be brought up as she should be, and we are contented when she is under your care.

H. C. G , Hamilton.—May God's blessing rest upon you always and may your good work go on forever. I thank you deeply for your letter, it gave us great comfort of mind We feel badly having to put our child so far from us but we must get reconciled to it, knowing it is for her good.

S. S , Big Springs.—I feel it my duty as a parent to express my thanks to you for the manner in which my son has improved in his last term as well as in all previous terms; and although we miss him very much in the home circle, yet we feel it our duty to him as well as to you to have him there at the opening of the new term. We feel it as well to have him under your careful management. I extend my grateful thanks to you and to the teachers and officers for the careful training of my child. May the Lord prosper you in your noble work.

W. J. Y., Hazzard's Corners.—"I believe you are doing all you can to make the children happy and contented. We wish you every success."

J. J. W., Hastings.—"We thank you very much for your kindness to Edith in giving her so much attention, and may the Lord bless you and your noble Institution always."

Mrs. A. L., Napanee.—Frank received your kind inquiries some time ago and feels highly obliged by the friendly attention you paid him. He often speaks of the Institute and wishes he were there again. I don't know what he would have done had he not received the instructions from your school for he reads and writes for past time for hours. He was delighted in hearing from you and feels that you have never forgotten him. He has good health and is known and respected by everyone in our town.

What Former Pupils Say.

Andrew C. A.—Trenton.—As I look back to my former years at school, I often wish I was there now. I thank you and all the teachers very much for the good education I received. I am getting along fairly. I am the only mute working among 500 employees at Messrs. Gilmour's new limits

Percy A.—Mountain Grove.—I am helping my father at present on a farm at Mountain Grove. We have had a prosperous season this year. The instruction I received at the D. and D. has been a great pleasure and convenience to me since I left school.

J. J.—Silver Hill.—You have been very kind to me, and I desire to express my gratitude. I think the instruction received at the Institution made me a better man, and added to my enjoyment and happiness in life.

Sarah A.—Newton Robinson.—I shall never forget the kindness shown to me while at the Institution by yourself and the teachers and officers. I live at home with my father and mother, and assist in housekeeping. I find the instruction I got while amongst your pupils invaluable to me in assisting with the business of the farm.

J. R. B.—Stratford.—I take much pleasure to inform you of the benefit I received at your Institution, and of my welfare since graduating. I feel more grateful than words can express to you and all who were more or less instrumental in my mental and manual development, without which it is certain I would not be what I am to-day—happy and contented, able to earn my daily necessaries independently and retaining the respect and esteem of all with whom I have to do. We all have our ups and downs in life, and in the course of my career I find I am no exception to the rule. Life is earnest; life is real, and, indeed, it all depends upon ourselves whether we get along good or ill. In almost anything I undertake, or with whatever I

am occupied, I am always more or less successful—due, no doubt, to the excellent mental and manual training received at your Institution, and for which God alone only knows the depth and fullness of my reverence and gratitude to my dear old "Alma Mater." May God, in his omnipresent glance abroad, put into the hearts of responsible Christians to do all in their power to have all uneducated deaf children share in the great advantage afforded by the Institution for the Deaf in their respective districts, that His great love to us may be shed abroad in the hearts of our unfortunate fellow beings. God bless and protect, encourage and guide you all, day by day, to carry on the noble work, and finally receive you into His kingdom with His "Well done, thou good and faithful servant"

Edith B.—Simcoe.—I am so thankful that I was sent to school, and I shall never forget your kindness to me at school. Give your family my kindest regards. Mr. B. and Mabel wish to be remembered to you.

George B.—Hesson.—I am very thankful for the instruction I received from you. I am at home helping to work 200 acres, and have a horse, buggy and cutter of my own.

Bamber B.—Ancaster—I liked the Belleville Institution very much, and the instruction I received while there has been, and will be, of lasting benefit to me. It is a pleasure for me to look back and think of the many happy days spent in the school. I loved the lessons and games very much. It is a pleasure to know that you still think of us; your good wishes for our welfare will ever be remembered by us, and rely upon it we still cherish a loving and tender regard for you. I work at my trade still, and in summer there is plenty of farm work to be done. My father, aged 90, and my mother, aged 75, are depending upon me for their support, and we have a beautiful little home which I take great pride in.

Thos. B.—Toronto.—I am doing well as a machinist, and may say that I am thankful to you and also to my teachers when I was at school. Mrs. B. is well. Remember me to Miss A. Mathison.

Thos. F. B.—Erin.—The instruction I got made me a better man, and made me able to get on with life's duties. It is a good thing to have a good education. I am a mason-tender and am doing well.

Jas. G. B.—Neepawa, Man.—I left school in 1880 and came to Manitoba. I have been farming since that time with very good success. I am glad to say the schooling I got was a great benefit to me.

C. B. B.—Simcoe.—I shall never forget your kindness to me when I was at school. I am thankful I was sent to school. My brother and I have an equal share in a farm of 200 acres, and keep a hired man. Miss S., Mrs. B. and I send our best regards, hoping you and your family are well.

Mrs. Fannie B.—Morewood.—I am glad that I learned as much as I did. I think your Institution gave me a much happier life. I send my best love to your wife and children. I am living with my brother, Levi Fetterley. I am thinking all the time of my husband and my little boy. It seems such a long time since I lost them. I am very lonesome here.

Earnest E. B.—Prescott.—I am working with my father in his shop, at carpenter work, turning, fancy brackets and other branches. The instruction I received at school did me good, but if I had stayed it would have been to my interest.

Wm. B.—Hamilton—I received the diploma you sent with great pleasure, I have been constantly employed with the Copp Bros., and am attempting to make myself generally useful working in the show-room where ready-made stoves and ranges stand for sale. I am well pleased with my situation I thank you for your kindness and care to me during my old school days, especially during my dangerous illness. God be thrice blessed and thanked that I did not then die. Many thanks to all my teachers for the instruction obtained.

Mabel B.—Windsor.—I cannot help thanking you again and again for my certificate, which I have just received. I was so delighted to get it. I thank you very much for your great care and kindness to me while at school and in my sickness. Give my love and best wishes to Miss Walker. I will always remember the many happy days I spent with you all.

Arthur B.—Pennville.—I am farming for myself and am prospering very nicely indeed. I find that the instruction I received at your Institution is of a very great benefit to me, and I wish you every success in your work.

Will C.—Owen Sound.—I am getting along O.K. in the selling business. Kindly remember me to all and all the teachers who know me.

J. R. C.—Winnipeg.—Thank you for the interest you have taken in me since leaving school. The instruction I received at your Institution has changed me from a "bashful" little boy to a happy young man. Truly, Mr. Mathison, I cannot find words to express my gratitude or

all you and your excellent staff have done for me. I have enjoyed a fair measure of success in my life work. For three years I held the position of Supervisor of Boys and Instructor of Printing at this Institution, and last year I was appointed a teacher. I love my work.

E. G. C.—Worcester, Mass.—I am still working in the piano and organ shop of A. H. Hammond Reed & Co. I have been working with them for five years steadily. I always thank you and the teachers for their kindness in teaching me lots when I was in school.

Albert E. C.—Dyer's Bay.—I am thankful to you for teaching me, and for your kindness. I am working on our farm.

Frances C.—Primrose.—I have been very well since I left school, and am now doing fancy work at home. I never forget you and the teachers at school.

Arthur C.—Aurora.—I have not forgotten the teachers' and officers' kindness, and also yours to me. I feel grateful to you and the others for my education. I am earning $15 a month and my board working for my brother.

Nellie C.—Oakville.—I shall never forget you or any of my teachers, for whom I shall always entertain the greatest respect and admiration, and shall always look back to my school days with warmest feelings for all connected with the Institution. I am dressmaking and make a very satisfactory livelihood, but regret that I did not remain longer with you. I cannot speak too highly of the instruction I received at Belleville Institution, and would be indeed ungrateful if I did not acknowledge that they have added very much to my happiness and general welfare.

Fred C.—Westport.—I was working at baking, but quit, as we were not busy. I would like to own or rent a bakery.

L. M. C.—Dunlop.—I think the instruction I received at the Institution made me a better woman and added to my enjoyment and happiness in life. I am tailoring and am doing pretty well.

Maggie T. C.—Windsor.—I assure you it is pleasing to know that you take such a deep interest in, and so kindly remember former pupils wherever their lots may be cast. I have not forgotten the Institution where I spent two pleasant and instructive years, which have added materially to my enjoyment, happiness and prosperity. Neither have I forgotten my classmates and teachers and am always delighted to hear from, and correspond with them and you. The memory of those happy days will last as long as life itself. Wishing yourself and the noble Institution every success, I am etc.

Jno. D.—Big Point.—I am thankful for what you have done for me; the only thing I am sorry for is, that I couldn't go longer to school to learn a little more. I am working at home on the farm. We have a good harvest this year but we have to work hard for it. Present my love to my teachers and those of my comrades that are left.

Jas. D.—Stratford.—I have still pleasant recollections of my Alma Mater, although I seem to have been very silent during these two years—leading a more retired life. I have not steady work but work as "extra" on both dailies in town whenever I am wanted.

Joseph D.—Sandhill.—I am working at home on the farm with my parents. I have been very busy with the harvest, and am ploughing for fall wheat.

Samuel D.—Sarnia.—I am glad that my parents sent me to school when I was nine years old, and I thank the institution because there the teachers taught me to write and spell with my fingers and understand what they explained about. I learned to be a printer, a shoemaker and carpenter, but I have been a laborer for several years, because the trades were not very well for me. I never forgot what my teacher, Prof. D. R. Coleman taught me in his class and I still thank him. We give our love and respect to all the teachers and officers in the Institution.

Maggie S. D.—Sarnia.—My parents sent me to school in Belleville when I was 10 years old. I learned to be a tailoress and dressmaker. I got married in 1884. I send my best love and regards to you all at the Institution.

John E.—Brockville.—I am in good health and prospering. I cannot work at my trade, shoemaking, because I suffer with a pain in my back when I work at it. I am now working on a farm near here.

Laura E.—London.—I am most pleased to be able to acknowledge the good I received from the Institution. It certainly has helped me on through life Until a few years ago I always lived with my parents but when they were taken away I came here and now stay with my oldest sister and family.

Sarah M. E.—Warburton.—I very often think of my teachers and school-mates and would like to meet you all again. I remain at home whith my parents enjoying good health. I regret not going to school longer, but child-like, I got very lonely to come home and did not want to go back. We fine learning very useful in life, better than silver or gold. Silver and gold will vanish away, but learning once got, will never decay.

Ina F. E.—St. Thomas.—I often think of you all and the pleasant times I had when I was at the Institution. The instruction I received has made me better and happier a thousand times. I shudder to think what I would have been if I had never received any instruction. I am at home helping my mother with the house-work. She says I am a great comfort to her. I am glad to be of use to her for she has always been very kind to me.

John F.—Toronto.—I have been employed up in the shoe factory for 16 years. I learned my trade in your shoe-shop at the Institution under Mr. Flowers. I wish to give you many thanks for my schooling. I can write and read well.

P. F.—Toronto.—Since I entered into life's duties I have been successful. I feel thankful to the Institution, that it made me a better man and added to my enjoyment and happiness in life. I am a shoemaker and have been working pretty steadily for 15 years. Have been married 10 years and have 5 children all bright and well.

Wm. N. F.—Housey's Rapids.—I am working on a farm. I am doing well. I have been working for my father since I left the Institution. My learning has made me a better man.

Joseph F.—Cardinal.—I am in good health and I am working at the Cardinal canal. I think the instruction I received at the Institution made me a better man, and added to my enjoyment and happiness in life.

John F. F.—Elkhart, Ind.—I have been getting on pretty well since I entered upon life's duties. I was setting type but I am just out of work at present. I think the instruction received at the Institution made me a better man and added to my enjoyment and happiness in life.

Sarah F.—Brantford.—I have been getting along very well since I left school. I am always thankful to God and to you and the officers for giving me a good education. I often tell my friends how well I was treated at the Institution. I am a dressmaker, and am getting along with a forewoman well. My folks want me to remember them to you. Remember me to my old teachers.

L. F.—St. George.—I am doing well at home. My sister and I are dressmaking here. We have been busy all the time and are getting as much work as we can do.

Joseph F.—Fall River.—I have not forgotten your great kindness to me when I was at school. I am getting on nicely here. I have been working at the cotton mill.

Jas. G.—Brantford.—I work for the Goold Bicycle Co. and I am doing well. I am a polisher I never forgot you for your kindness to me, and I thank you and your teachers.

W. H. G.—London.—I certainly have not forgotten you. I am sure that you were kind to me while I was at school. I am doing very well at shoemaking in my own shop. I find my education a great assistance to me, and I must thank you and the teachers of your school for their interest in my behalf. I wish you all health and prosperity at home. My parents are well and present their kindest regards.

Thos. M. G.—Vancouver.—I have been in the City Hospital here for a year and six months. The matron told me that she thought my lungs are getting stronger. I could not work as a tailor because the shops were full and I changed to be a laborer.

Daniel G.—Charing Cross.—I often think of you and the teachers. I will be happy if you write to me. I have worked on a farm for two and a half months. Formerly I worked a the sewer-pipes in Maple City. I can not get steady work.

D. B.—Merrivale.—I hope you will over-look my neglect in not answering sooner ; it is a poor return for all your past kindness to treat you so, and it won't happen again if I can prevent it. I am farming and own my own farm and I am doing very well. Before I went to the Institution I thought I had a very poor chance for an independent life, but when I went there, learned what the deaf had done and were doing, deafness soon began to appear not quite so unbearable a burden as I at first supposed, and I need scarcely say when deafness ceases to be something we should be ashamed of the deaf person is certainly a great deal happier. My stay at the Institution made me a better and happier man, to say nothing of the friends I made there, and who are in nearly every part of Ontario and who always speak of the officials and teachers with the most affectionate respect. Since I graduated I have met over three hundred of your former pupils and never heard a single complaint from one of them.

N. A. McG.—Toronto.—I am happy to inform you that I have steady work in the brush factory. I have been at the factory for six years. I am prospering well. The instruction I received at the Institution made me a better man and added to my enjoyment and happiness in life.

Margaret G.—Germania.—I am well at present but have at times been troubled with a thick neck. I am still living with my parents and helping my mother with the house work. I am very glad that I have been with you in Belleville Institution, for I know that the instructions I received there have helped me very much to get along ever since I left there.

Heppy H.—Londesboro.—I am getting along very nicely. I have tried Sligh's dress-cutting method and found it very satisfactory. I am indeed thankful for my education, for without it I could not get along. I am sure I shall ever remember the interest you and the teachers took in my welfare.

E. J. H.—Harriston.—I assure you, we, the graduates of the Belleville school appreciate your kind thoughtfulness in being yet interested in our welfare after so many years' absence from school. We often think of our old school-mates and remember with gratitude the kindness and patience of our teachers in imparting knowledge to us, that was to make us happy and useful men and women. I have advanced myself in taking lessons in both drawing and painting, and have secured many prizes. I have also learned housekeeping and dressmaking, and expect soon to learn millinery so that I hope to be a thoroughly useful woman. I also spend a great deal of time in reading good literature and the leading newspapers of the day which, thanks to my education I can both understand and enjoy.

Charles H.—Plattsville.—I am well and happy. I work at farming now and then, but most of my time I work at home helping my mother in her garden as she is getting old. I have it in fine shape. I think the Institution did me a lot of good.

Daniel H.—Mooretown.—I have rented my farm and live with my mother and am enjoying myself finely.

Christie A. H.—Chesterville.—I am living at home with my sister. The instruction I received at school has been a great benefit to me. It is the greatest blessing that has come to me. Through it I enjoy a great many other blessings that I could not enjoy if I had not gone to school.

Thos. H.—Owen Sound.—I have been living in Owen Sound, and am working on the C. P. R. S.S. Athabasca. The captain and two mates can talk to me on their fingers.

Wm. H.—Arkwright.—The instruction I received at the Institution has done me a great deal of good, though I regret to say that I have forgotten a great deal, as I have been working on the farm ever since I left there. I am not very strong and think it would have been better had I kept at the trade I was learning at the Institution.

G. F. H.—Burk's Falls.—I used to work on a dredge on the Maganetawan River, and afterwards I went to work on a steam boat, but I am going to stay at home to help my folks to work on their farm.

Jonathan H.—Talbotville.—I am helping my brothers to work on the farm, but I am sorry to tell you that I am sick of farming. I was a printer but could not get a job as the printers were out of work. I don't like to depend upon my mother and brothers for a living. I am sure I shall ever remember the interest you and the teachers took in my behalf.

Mrs. Wm. H.—L'Amable.—Give my regards to old friends. We are doing well here. My husband is a blacksmith.

Thos. H.—Delta.—I am well satisfied to have got a fair education at the Institution. I am a shoemaker and shoe merchant. I am doing very well. I think that the instruction I received at the Institution made me a better man and made me feel to thank the Institution for making me wise. It gave me good enjoyment and happiness in life.

H. A. H.—Glen Walter.—I am happy and well. I work on the farm all summer and I like it. I go to church every Sunday. I send my love to you and all the teachers.

Thomas J.—Dublin.—I am shoemaker here. My health is good. People are pleased to get cheaper boots and shoes from the shoe factories but I often fix their old ones. I am more patient than hearing people.

John J. J.—Neepawa.—I never forget the old school. I frequently think of it since I left it in 1877. I started to learn the trade of framing barns, houses, etc., when I was at home in Ontario, and I was successful working at buildings for six years. Then I came out to Manitoba 1½ years ago and found lots of my old friends and relations here. I am still successful in building lots of houses, etc., this summer.

Eva I. J.—Ottawa, Ont.—We are summering at Britannia Bay. I am in splendid health. I stay at home to do housework. I never forget that Miss Walker acted motherly to me when I was at school. She always helped me when I was sick. I am very grateful to God for sending me to school to get an education. Give my best love to Miss Walker. I send my best regards to you all.

Mary J.—Bobcaygeon.—I am at home all the time since I left the Institution and I have to do the housework. I think the instructions I received at the Institution made me a better woman and made me have more enjoyment and happiness of life. I should be very thankful to

you and everybody who taught me to be a wise and good scholar. We all send you our best respects and kind remembrance. I send my best respects to Miss Walker. Keep a share of that for yourself. I hope God will bless and keep you always.

Willie K.– Oil Springs.—I need not say much about my circumstances in connection with the school, as you no doubt know all about it. I am not conscious that I am so blind as I can see around well, but find some difficulty to recognize the things near around *at once*. I use a magnifying glass for writing, etc. I am happy to think that I have done some good by writing for the "Mute."

Henrietta J. L.—Maundaumin.—I am living at home with my parents on a farm assisting my mother with her work. I am much pleased with the instructions I received at the Institution, and it has made my life a more enjoyable one. I send my best wishes and regards to yourself and all.

Geo. A. K., Glenmeyer.—It gratifies me to say that my school days and our old intimacy, I look upon as among the few passages in my life that I can never forget, and I am more sensible now than in boyhood of the kindness which you loaded me with.

Geo. W. K., Deseronto.—I worked in the mill at Fenelon Falls, and in the cedar mills here.

Robert M. K., Bird's Creek.—I never forget you and the kind institution where I learned so much. I am finding the benefit of it every day. I am working on the farm with my brother.

John A. K., Bird's Creek.—The instruction I received at the Institution made me a better man and added to my enjoyment and happiness in life. I never forget when I was at school, you always gave me comfort. I am helping my father to work on a farm.

Annie S. L., Port Granby.—I am living at home with my brother on the farm and I am quite busy. I am well and quite happy. I am sure the instruction I received at school made me a better woman. I would be quite miserable if I could not read and write. I am very thankful to you and my teachers for the trouble you took to teach me while at school and the interest you still take in my welfare.

W. L., Winnipeg.—"Your circular letter to hand, and in reply I would say that we are only too happy to comply with your request. However, we do not comprehend why you should undertake such means of ascertaining the welfare of the graduates of your noble institution, and if they really have been benefited by the tuition, etc., they received there. We suppose there must still exist in your midst some doubting Thomases *re* deaf-mute education, and you are most anxious to clear it up as far as you can by bringing forth 'testimonials of the light,' or at least testimonials from those who have been enlightened during their stay at your school, and under your kind and fatherly care. I still work at my old trade, that of a compositor, occasionally, and am doing fairly well, despite the type-setting machines being in full blast in all the leading city printing offices at present. Were it not for the instruction I received at the Belleville school for the deaf, my life would have been a very desolate and melancholy one indeed For people in the full possession of their speech and hearing to be deprived of an education, I consider bad enough, but for deaf mutes to be deprived of such an inestimable blessing, as an education is, in my humble opinion a crying and heartrending calamity. An uneducated deaf mute is a burden to himself, to his family and friends, to say nothing of what a danger he is to society at large. Perhaps it is a little expensive to the country to maintain such institutions, but it is the bounden duty of the Government to do so, and pays well in the long run. Better, aye, far better give deaf mutes the advantages of an education than allow them to grow up to manhood and womanhood in ignorance. Mr. Matheson, do not think I am flattering you, for I am only telling the truth, when I say that when you took over the management of our beloved *alma mater* everything was almost in a state of chaos and lethargy, but you set to work with a might and will; had all the bad and worthless teachers and officers weeded out of your garden, infused new life and vigor into those whom you kept, and to-day your school is second to none in America. May you be long spared to reign over the destinies of our beloved alma mater, is the fervent wish and prayer of yours sincerely." W. and M. L.

Mary C. S., Windsor.—Seems to me ever since I looked my last in the dear old institution, I had done nothing but "blow" of what it had done for me. Do I think my life and education at the institution had done me any good? What a funny question. Do you know I have always told anyone who tried to sympathize with my affliction that I never regarded it as one. I am not exactly an angel now, but I learned to look at life from a nobler point of view. You have shown me that we should not think of ourselves alone. There are lots, I know, worse off than we are, if only the mutes would not be so content to be left out of things. If they only had a little more "go" in them, and asserted their rights. I don't let anyone "sit on" me. I know as long as I hav'nt done anything contrary to the laws, I have as much right in society as the next person, and I stick there and make myself agreeable or disagreeable as you please. It was hardly

necessary for you to say you still took an interest in me. Your many kind letters and favors since I left school are ample proof of that. When I work it is at printing, and I make fair wages, but lately I have not found it necessary to earn my living and do not expect to work out again. You have always been so good to me that I think I am bound to tell you my intentions. Before school opens again I am to be married. To no less a person than your old pupil A. S. Perhaps in two weeks. He is doing very well and seems fond of me. Of course that is'nt how I usually describe his affections—but—er—I guess it will fit. I really would not change places with Laurier or anyone else. I can read lips so well that very few people notice my deafness. Some say I talk well I try to speak slowly. B. does not talk as well as he did at school. He does not stop. He strings everything off at once and the effect is sometimes ludicrous on strangers. I never get tired talking about "old times at Belleville." Wish I could go down and see you all. Hope you will find time to drop me a line before the great event, in which I give up my freedom, comes off. Remember me to Miss Walker and any others, also Miss Annie. This is not the kind of a letter I should write I suppose, but somehow I can't keep to the respected sir, etc., etc., style. I'll send you a funny article, "getting married" (if I survive the experiment) for the paper in September.

Clara S., Ottawa.—I am working for Mr. Eddy, Hull, and am doing very well. I can certainly tell you that I have benefitted very much by the instruction I received at the institution and am very thankful.

Levi L., Vanessa.—I am getting along nicely here. I am working in Waterford now and am very busy. I certainly have not forgotten your kindness, and I am very thankful to you for it.

Noe L., St. Albert.—I am shoemaking and my business is very fair. I feel that I must be thankful to the Ontario Government for my education. It made me a better man and added to my enjoyment and happiness in life. Bestow my love to all the teachers and the pupils when they are at school.

Matilda L., Windsor.—We are getting along as nicely as can be expected these hard times. In the spring and fall of the year I am busy at D. M. Ferry's seed store. The rest of the time I am at home with my sister Sophia, assisting dear mother at housework. Thanks to you, the Government and the teachers for our education.

Sophia L., Windsor.—Sister Matilda and I often speak of our school days—they were happy ones. I stay at home and help dear mamma. She is not very strong now. God bless you all.

Carrie L., Vanessa.—I am working out as a servant girl. I am getting along very well so far. The instruction I received has helped me on in life a great deal and made me more happy. I shall never forget your kindness to me.

W. C. McK., Woodstock.—I must be grateful to you for your kindness while at school. I have steady work at the bicycle factory here. I am in the repair department.

Thomas McG., Hamilton.—I am out of work for some months. It is hard times. I am going to work at paper-hanging soon.

George McD., Orillia.—I have enjoyed my education very much. The instruction at the Institution has helped me very much for my life's duties. I am working at the wood-work in the carriage factory in Orillia. I am very thankful to the Ontario Government for giving the school where deaf mute people can learn.

Bella McC., Ottawa.—I am married and keeping house. We are well and happy and prospering. We have a good home of our own My husband is a good, kind, Christian man. He works as a printer in the Government printing bureau here. I am thankful for the instruction I received at your Institution as it has made my life brighter and happier and more useful. May God bless you and your officers for the noble work you have done and are doing for the deaf mutes.

Peter J. M., Almonte.—I am working in the Almonte knitting mill. I have worked here or two and a half years. I formerly worked for my brother in the barber shop.

John D. McK., Laurium, Mich.—I am earning $50 per month unloading timber.

Murdy McR., Cannington.—I am getting along fairly well in life. My brothers and I are working a rented farm of two hundred acres, and we also have two threshing machines that we hold as our own. I learned the trade of tailoring in Beaverton but I was too closely confined and so got sick. I went to Michigan and worked in a saw mill and recovered my health quickly.

Katie McM., Hamilton.—I often thought of you and your kindness to me. I am helping my mother at home. I think what I learned at school with you did make my life happier.

Hattie A. M., Goodstown.—I am still at home and enjoying life on the farm with my father, sister and two brothers. I send my best respects to you and all connected with the Institution.

M. E. McD., Winnipeg.—When I pause to think of what my life might have been, it fills me with horror, and at the same time I am inspired with feelings of thankfulness that I was granted that inestimable privilege which the advance of civilization has provided for all afflicted like me. I can now recall my condition as a child, not that I was unhappy or conscious of the difference between me and other children. My mind was almost a blank. I was active physically, and took as much enjoyment out of childish games as other children, but could not think or reason further than my sense of sight, touch, smell and taste guided me. I saw other children laughing and talking but did not understand or realize the great advantage they had over me. I went to church, saw the people kneeling in prayer, but understood it not. I did not know there was a God. In brief, I knew only what I could see. How limited and circumscribed, and how sad and terrible to commit a human being to such a doom—a certain reality if an education is not provided. The Belleville has done for me what it has done for many others—turned darkness into light, and made it possible for me to use the gifts God has given me. It is a privilege to be able to testify to the excellent Institution over which you preside, which not only educates mentally, but morally and spiritually.

Mrs. A. W. M., Toronto.—Mr. M. says he could never have received an education at home as the one he received at the Institution. He thanks the teachers who encouraged him in his studies for an artist that he has been able to make an honest living equal to any hearing person. As for myself I was a most unhappy little girl till I entered the Institution. I have felt ever grateful that there is such an institution where those so unfortunate as to be deaf can receive an education. I further confess that when I entered the Institution I was very ignorant of politeness and good manners, and I am thankful for what I learned in the Institution.

John M., Napanee Mills.—I am working at the cement works here and have been for seven years. The instruction I received at the Institution has done me a great deal of good. I have not forgotten it. I never lie, or drink liquor of any kind, and try to live to please my Maker.

Dolly M., Reay.—I am working at home. I am proud of having been educated at such a good Institution as Belleville. I think the schooling did me good, but I am sorry I did not learn a trade, as dressmaking or tailoring, while I was at school. I often speak of the Institution at Belleville highly to my friends.

Maggie F., Mitchell.—I have been housekeeping with my parents and have been out dressmaking sometimes I am thankful to you for your goodness to me while I was at school. I have never forgotten you. My mother thinks it has been a very great help and blessing to me. She can't find words to express her appreciation of the especial kindness of yourself and officers generally, and would most heartily recommend the Institution to all who are deaf.

Roderick McK., Florence.—Since I left Belleville school sixteen years ago I have been carpentering. I feel a better man and enjoy good times everywhere I go to work.

Minnie A. H., Clinton.—I am very thankful to you and all the officers of the Institution for your kindness to me when I was at school. I do not know what I would have done without a good education. I have been learning dressmaking; I expect to open a shop with a partner in the fall if times keep good. I wish you every success.

Matthew M., North Augusta.—I am working on my father's farm. I give my best love to you.

Flora McG., Toronto.—I have not entered upon the cares of the world yet, I am staying at home. I have found my education a great benefit to me as I don't feel ignorant when I am in the presence of company, and I am very thankful to you and to all my teachers that have taken an interest in me to give me such a good education. It makes me feel very happy. I will never forget your kindness to me, and I feel very grateful indeed to you all.

A. A. McF., Toronto.—I think I have been doing pretty well since my graduation in 1879, either in making money or in gathering knowledge. The education obtained at school has proved a great blessing to me in more than one way. I would have been quite the reverse without it. I am printer and typograph operator by occupation.

Aggie M., Komoka.—I am always at home and have always plenty to do. I think the instruction I received at the Institution has helped me a lot. I hope this will find you all well at the Institution, and that you and Miss Walker and all may enjoy the holidays.

Ada M., Hyde Park.—I am living at home with my father and mother on the farm.

Duncan A. M., Spanish River.—I still work in the saw mill and am doing well.

Maude McG., Purpleville.—I am at home helping my mother with the work. You were so kind to me while I was at school. I am grateful to all the teachers for their kindness as they taught me and helped me in everything when I was at school. I send my kindest regards to you and Miss Walker.

Wm. H. McQ., Blairton.—I work in the shanty in winter, and with my brothers on the farm in summer.

Samuel M., Ottawa.—I am shoemaking here. I thank you that I was educated at your school.

Alex. McC., Charing Cross.—It is a long time since I attended school at Belleville. I am sure the instruction I received has been a great benefit to me, and added to my enjoyment and happiness through life. I am only a farm laborer but am very content with my lot. Remember me to any of my old friends.

Alexander E. McD., Atherly.—I did not have as good schooling as many others, but the education I did get I am very thankful for, as it has helped me on in life very much. I have been farming and also working at carpentering with my hearing brother, but he has died. This spring and summer I was working at gardening for Captain McD., but I am at home just now.

Agnes F. McF., Forest.—I am now working for my parents on the farm. Be kind to Miss Walker and all the teachers. I send my best love to them.

Joe E. M., Kincardine.—I have not got any work for some years. I board in the Morgan House.

Mary N., Elmira.—I am a hired girl for Mr. M. Martin, and I like it very well. Yes, the instruction at your Institution made me a better and a happy woman. I must say that I never forget what I received at school and your kindness to me. I would like to go to school again but it is too late for me. I will keep in remembrance your kindness to me while I was at school.

Lorinda N., Haysville.—I have a good education but I am very sorry that I have not enough. I work with my cousin, Isaiah R., and I like it well. I send best wishes and regards to you and your friends.

H. L. N., Alliston.—I am prospering well. I am still working at home. I know the instruction I received in the Institution made me a lot better than I was before I went to school. Life would have been very lonely to me if I could not read and write. I thank you very much for the great attention you and the teachers gave to my education. I give my best regards and love to you all.

C. and E. N., Harper.—I am dressmaking at home, and sister E. helps her mother to work. We are getting along well, and are very thankful for the instruction and education we received at the Institution. We take much interest in the institution and all the teachers, and take this opportunity of thanking you all for the kindness shown to us.

O. N., New Hamburg.—Isaiah and myself are working on the farm, which suits us very well. We are thankful that the Institution was built for the education of the deaf. I don't know what I would be had I not been sent to school to get educated.

Isaiah N., Wilmot Centre.—I don't know how I should be getting along in my life had I not been sent to school. I am still prospering on the farm. Please accept my heartfelt thanks for your kindness to me while at school.

Nancy P., Poplar Hill.—My husband is doing splendidly. He is a farmer and has one of the best farms in this part of the country. We can't feel too thankful for the education we received at the Institution, or forget the kindness shown us while there. We send kindest regards and best wishes and hope you may long be spared to fill the place you have, and to be a friend to the deaf.

Chas. Joel P., Guelph.—We always remember you. I am moulder at the Raymond's shop and we are pretty busy this summer. I send kindest regards to all.

Mrs. W. A. P., Lisle.—I am making pants, coats and vests. My husband is working in the mill here. I send my best regards to all.

A. M. P., Cobourg.—I take in plain sewing occasionally and go out by the day when I can get sewing to do, and try to earn my living.

Maggie R., Mimosa.—I am helping my mother with the housework. I am very happy. My education gives me much enjoyment in being able to read and understand. The Institution is a great blessing to the pupils who go to it. I know it has been to me.

Suseelia R., Lansdowne.—I assure you the instruction I received has been both a pleasure and a benefit to me. I have learned dressmaking and live at home with my parents and brothers and sisters and do housework in genera .

Willie P. Q., Stratford.—I have been living on my father's farm and the country life always agrees with me. The education I received at your school helps me a good deal to do what I want. Had I not gone to school I would not be able to read or write or make a living myself. I feel very thankful that I was educated at your school and I am very glad that I can read, write and prosper.

William R., Rockton. -I am working on a farm of 100 acres with my brother and we are getting along very well. I think times would be dull if I had never gone to school. Give my kind love to all.

Chas. R., Woodstock.—I am in Woodstock at present, and out of work just now. I feel thankful to you for the instruction received at the Institution. I was working at the Goold bicycle works, but am laid off now.

George H. R , Perth Road.—I am working on a farm.

Isabella V., Woodlands.—I am married and have a good, kind husband and a good home. am happy and can say cheerfully that I received much benefit from your instruction. It has added happiness to my life.

Joseph R., Leamington.—I am working with a farmer.

Wm. R., Mulock.—I am working on the farm at home. The crops are good. I go to Sunday school, and can read the Bible.

Emile S., Big Point.—I often think of my teachers and comrades and would like to be with them. I am perfectly well satisfied with what I received at school and I am a thousand times obliged to you for it. Tell my teachers that I think of them often, and give my love to all that I know. We are busy at the harvest.

Mabel S., Delaware.—My sister E. has been married nearly a year. I feel very lonely at home without her. How much worse I would feel if I had not been so well educated and can read and do many kinds of fancy work ! E. and I never forget to be thankful for our school home. It made me able to meet hearing people and to enjoy the society of good and wise people, and we were taught at school to love God and to read the Bible. We feel thankful to you and our teachers who took so much trouble to teach us. We both wish you success in the school.

Moses S., Rockland.—I am working in the saw mill and save $11 a month, but have been working on the farm at home.

Chas. S , Toronto.—I learned coopering with my father. I have not had steady work. I thank God for the little education I received and for giving me kind teachers and principal.

A. E. S., Brantford.—I have so often seen proof of your interest in your old pupils that it needed not your letter to remind me of it. I have worked at the trade I learned at the Institution ever since I left you with the exception of a couple of months last winter after the diphtheria carried off two of our children. As I could get go trade on account of the sickness I was compelled to close my shop. All your former pupils around here are doing well and without exception are steady, industrious men and women which, I think is ample proof of the good done at the Institution. Another thing which I am sure will give you satisfaction is to know that they all speak in glowing terms of their old teachers. My wife joins me in sending you our kindest regards and hope you may long be spared to carry on the work you so well do at present.

Wm. N. S., Alliston.—I am out of a job and cannot find work to do.

Francis Wm. S., Blackstock.—I am living on a farm in Cartwright, and am doing as well as can be expected. I am satisfied that my education at your school has made me a better man than I would have been had I not gone to school at all. I hope your Institution will prosper and for many years be a benefit to the deaf and dumb. My brother and I are joint owners of a farm of 127 acres convenient to the village.

Wm. W. S., Lanark.—I do not get steady work, but I made some rustic work in my shop and sold it. I own my shop and house. I find my schooling and trade a great help to me. Give my love to all deaf-mutes.

Edmond S., Boissevain.—I am doing fairly well. I am quite a good artist, but at present I am not following that trade. I am working a farm with my father, I am very thankful for the good education I acquired while at the Institution. It is of great benefit to me. I am fond of reading good literature.

Samuel S., Dundas.—I am acting as upholsterer, mattras-maker, finisher and all kinds of carpentering. My wife always talks of your kindness to her.

David A. T., Florence.—I own fifty acres of land and the crops are splendid this year. I hope God will bless and spare you till we meet at the convention.

John T., Toronto.—I thank you for what the school has done for me. I have worked for Wm. Davies and Co., Limited, for thirteen years and I like my job. I thank God and I thank you for my schooling. I am happy and comfortable.

Wm. A. T., Carleton Place.—I have been getting on well since I received my education at the Institution. I am still working on a fine farm and I am doing well. I have never forgotten you nor any of the officers or teachers and pupils since I left school. I hope that God will bless you.

Christina V., Woodlands.—I hope God will bless you for your kindness. I am still at home and help my parents at house work.

J. C. W., Chiswick, Middlesex, England.—I certainly think the instruction I received at the Institution made me a better man. I have now work at the Metropolitan District Railway Company in London, typewriting, drawing plans, etc. I am going to Switzerland with the Polytechnic party next month for a week. I went to Holland and Belgium with the Polytechnic party last year. I send you my kindest regards.

S. R. W., Chiswick, England.—I am working at Chiswick School of Arts and Crafts. I am a wood carver. I have enjoyment and happiness in my life. I give my kind regards to you.

Richard W. W., Orillia.—I am doing a big business with my mother in the large fruit orchard and also the garden. I think the instruction of the Institution made me happier in life and enjoy it. I must say that I thank you for it.

Mr. and Mrs Wm. W., Newcomb Mills.—We feel thankful for the instruction we received at the Institution as it has made us better. We are doing well on a farm of twelve acres. We send you our best regards and wishes.

Walter W., Sarnia.—I am working steadily at the harness trade in Port Huron. I like my trade very well. I have been greatly helped by the education which I received at your school.

Rose W., Georgetown.—I am living with my grandmother. I thank God I am getting a better girl, and my life is happy. I am fond of reading and am a good worker. I will endeavor to make my grandmother's life happy as well as my own, by God's help doing to my utmost what is right. My grandmother joins with me in kindest regards, and may you long be spared to watch over the interests of your late pupils.

Thomas W., Newcomb Mills.—When I was at school I was not as attentive as I should have been, still what I did learn has been of great benefit to me. I am helping my father on the farm at present. I shall always remember my school days, your kindness to me and the good advice you gave on leaving school. I hope you may be long spared to fill your very useful position.

Lena M. Y., Cassel.—I am busy working at home. I help my dear mother. I send my best love to Miss Templeton and the other teachers of the Institution.

George Y., Madoc.—I am working at farming and the carpenter trade. I am getting along nicely. We do not know how to thank you and our old teachers enough for the education we received at the Institution. It has been a great blessing to us as well as to the rest of the old scholars. Remember us and give our love and best wishes to all in the school.

Gustave Y., Greenock.—I am working at mason work. I think the instruction did me a great deal of good. I am so glad that I did go to the Institution. It made me a better man.

John C. Y., Madoc.—I certainly have not forgotten your great kindness to me while at school. I am getting on very well here. I work at farming and like it very much. I make quite a little money.

Walter H. M., Ont. Asylum for Insane, London.—I am doing well. I am confined here for a long time.

Ernie H., Hamilton.—I send my regards to you and Mr. Burns. I would like to return to school to learn to be an expert pressman.

W. G. B., Toronto.—I have not been doing anything since I left school, but last March I began to feel anxious to be a milliner. I am just through learning and am having holidays now. We have a great beautiful big baby that my sister Mrs. F. left. You may know that it was a great trouble but God gave us strength to bear with our great affliction He knows best and what comes to us is through Him. We must then try and be resigned. There are times when our words seem altogether inadequate to meet the needs of the case, when even the tenderest human touch only causes the anguish-riven heart to shrink and cry out afresh. At such times only the touch of the Divine hand can be borne and while this may press heavily, we know it can never be too heavily, for is not this the hand that was pierced for us "the hand that bears the nail-prints for evermore," and "when the pressure is sorest the hand must be nearest," and we have heard the Divine words "Fear thou not, for I am with thee; be not dismayed for I am thy God, yea, I will uphold thee with the right hand of my righteousness." "When thou passest through the waters I will be with thee and through the rivers they shall not overflow thee." You know that we have already experienced the truth of this, for how otherwise could we have borne his crushing sorrow. Kindly give my choice regards to your family.

Culver B. B., Simcoe.—Received my certificate for "good conduct." Thank you very much. It came to me quite unexpected. I shall prize it highly. How can I thank you suf-

ficiently for all your kindness to me. I often think of the many happy days I spent at the Institution.

Maggie E. B., Ottawa.—I cannot in words express my thanks to you and Dr. Chamberlain for sending me the diploma. I am sure I can never forget your kindness to me when I was at school, and now in sending me this much-prized gift. I shall get it framed to keep it safe, and hang it where I can see it every day for I am proud of having it from you and Dr. Chamberlain. I send my best respects to you and all my old teachers and Miss Walker.

Sarah E. B., Sault Ste. Marie, Mich.—I have been very busy dressmaking. A large number of ladies come to me to make their dresses, and it keeps me so busy that I have not much time to write letters. I help my mother to do all the housework and then sit down and sew for people. I was sick for over two months and I prayed to God to make me better and he did. I give Him thanks for His loving kindness toward me. I am as strong as I can be. I do not think I shall ever forget your kindness to me.

Patrick C., St. Eugene.—I help to work on three farms and am well. My sister, Kate C. is married to Mr Moses V. He is a farmer and is well off. They live about eight miles from here. I send my best respects to your sons and daughters and others, and to yourself.

Archie C., Springhill (?).—I am busy working at the harvest. My mother died two weeks ago, aged eighty-eight years. My father is still living, he is ninty-one years old. My sister Margaret is well. She is at home all the time.

James D., Winnipeg.—I acknowledge the receipt to-day of the certificate of honor. This is quite unexpected as it has been upwards of eleven years since I graduated from my Alma Mater. I am doubly glad to receive the certificate as I have never solicited for it myself. It will always serve as a reminder of my plesant times at my dear old school, besides being a monument to my progress of studies under your able superintendency. Let me thank you very much for so remembering me after all these years. You will be pleased to hear that I am doing very well in this, my adopted city, also are all the others with the exception of Mr. Wm. L., who has been displaced from his job by the introduction of setting-type machines at the Free Press office. The *Canadian Mute* is always a welcome visitor in Winnipeg. Its continuous success is my earnest wish. I hope you are enjoying prosperity and happiness at your great palace with hundreds of children. Remember me to the teachers and all who know me.

Wm. J. E., Peterboro.—I am not working regularly. I had no work all last winter. This summer I got work on the corporation for about one month. Just now I have no work at all except two days a week at Mr. Rogers, trimming his lawn. I used to work for Mr. Mason at the greenhouses but did not get enough money for it.

Laura F., Woodlands (Pembroke).—You will be surprised to hear that I was united in the bonds of matrimony on the 27th of May, 1896, to Albert Fraser of Pembroke. We are getting along nicely. We are visiting my parents at Pembroke. I shall never forget my days at the Institution and your great kindness. I received a great deal of good, and it helps to make this life brighter to me. With regards to Miss Walker and the teachers not forgetting yourself.

Hedley G., Bracebridge.—I have nothing to do. I used to work in the Imperial Straw Works, of which my brother was manager. I worked for him for nearly 6 years. I sometimes work for Mr. S——, sailmaker, but they have no work for me now. I am staying with Miss McConnell, who joins with me in sending you our kind regards.

J. U. G., Duncrief.—I have a house rented here. I have six children. I and my four oldest boys are working out.

Lewis M. H., Diamond.—I have been very busy with grain and I like farming very well. Levi has been working for me (since his uncle was hanged). He is getting along very well. Robert Scissons has a nephew deaf and mute, about 9 years old, but I don't know what his name is. We never forget your kindness while we were at school and we are grateful to you. My wife joins me in sending you all our best love.

Fred R., Markham.—When I left school I went to work in a blacksmith shop. Afterwards I went to work on a farm. I hope that God will bless you.

————, Brantford.—I find that some of the mutes have not written to you, so I will tell you what they are doing. Robert Sutton still works in the Courtland Carriage Works where he has been for a number of years. He has steady work and is successful. Archie Smith is the only one who has no particular employment, but as he drives a fine horse and stylish buggy we may conclude he don't have to work. Joshua Lloyd is still employed in the Massey-Harris shops where he has been for a number of years. This year the firm only laid off their men two weeks. No doubt the change in Government had something to do with it. Robert McPherson works at tailoring in one of our leading establishments. He expects to leave us soon and go to Hamilton where he has an offer of a good situation under a former foreman.

We will miss him. Mr. and Mrs. Henry Gottlieb came here some three years ago and are still here. Henry works in a laundry and has steady work and good pay. Miss Sarah Foulds, the only unmarried mute lady in the city, works at dressmaking. Mr. and Mrs. James Braven, who have been living in Buffalo for a number of years, recently moved to our city. Mr. Braven has a good situation with Shultz Bros., contractors. We are glad to have them with us. Chas. Ryan, formerly of Woodstock, got a situation in the Goold bicycle works learning to polish metal. He has been away on his wheel for about two months. Mr. and Mrs. Smyth who have lived in Hamilton and Dundas moved to Brantford a few weeks ago, so our mute population is on the increase. Mrs. Smyth was formerly a pupil of the Institution. Mr. Smyth came from Ireland. He works for Mr. Smith, harnessmaker.

R. S., S. March.—I am a farmer and have worked on my father's farm since I left school 18 years ago. I own 100 acres of land which I have rented to my brother, who won the gold and silver medals for the best agricultural farm in the county. We keep a lot of cows and send our milk to the cheese factory. We have a fine orchard of all kinds of fruits. I give my best love to you and all.

Mrs. Christopher S., Simcoe.—My name was Mary Ann McM. before I married Mr. Christopher S. I have two fine children. My oldest girl is seven years old. She will be able to go to school soon. We are doing well. God bless you and all the teachers.

Robert R. R., Toronto.—I have always felt very grateful to the Institution for the education and the general good I received there. I can say without hesitation that I would be unable to have achieved the success in life I have, if I had not been to the Institution. I have hardly ever felt any trouble in making myself understood to any one I have had business dealings with, and this I owe to the Belleville Institution.

John T. T., Singhampton.—I have been helping my father on the farm ever since I left the Institution 13 years ago, except for some two or three months sometimes in the fall when I worked for some shoemakers. I am doing well on the farm and feel happy. Yes, the instruction I received at the Institution made me a better man, and I enjoy my knowledge and education.

Eva A. G., Berlin.—I am very much pleased to tell you that I am staying with my sister Mrs. M., and am enjoying good health. I feel ever grateful for the education I received at the Belleville Institution. Without it I would not be able to enjoy the pleasures of life. I shall never forget the kindness bestowed upon me by all the officers and teachers, and particularly you, Mr. Mathison. I wish you every success in your great responsibility.

B. M. T., Toronto.—I certainly have not forgotten your kindness when I was at school. I am enjoying good health, and I hope you are in the best of health. I find my education a great assistance, and must thank you and the teachers for the interest you took in my behalf.

Mr. and Mrs. Wm. W., Los Angeles.—Regarding the advantages of education received at your Institution I wish to say that it has been a great blessing to me and William, and that I am very happy and grateful for having been in the school over which you so ably preside. I am married and happily settled in Southern California. My husband is a deaf mute and we have a bright and intelligent little boy who can hear and speak. We own a ranch of 25 acres in Ventura, Cal., and other property in Los Angeles and are doing well. William was educated partly in Ireland, and in Belleville 3 years. He is equally grateful for the great benefits he received. He was a miner in Santa Fe, New Mexico, for five years, and then came to California where we have been for ten years. We are both happy and contented and trying to lead good Catholic Christian lives, discharging our duties as becomes good and useful citizens. We will ever feel grateful to you for your great kindness, and for the inestimable blessing of instruction we received at your school. God bless you and prosper the good work you are carrying on. We give our best wishes to you and all.

Aline de B., Dundas.—Many thanks for the trouble you took for me: of course I am sorry it is impossible for me to find a situation at present, but I have not given up hoping that the future has something in store for me. You are very kind, dear Mr. Mathison, to offer to let me return to Belleville and I feel very grateful to you for this favor and the many others you have shown me; however I cannot avail myself of your kind permission for mother has decided that I am to stay at home. Will you please remember me to Miss Walker? Thank you once more for all your kindness to me while I was under your care.

A. H. C., London.—Few words will be enough to tell you how I am doing. I do not blush to admit that my position is not high, yet in my eyes it seems capable of guarding my employer's interest and of improving his credit. My business is to see to the goods ordered, and pack them, and look after the boxes and parcels shipped properly. As to the benefits I received from the Institution there are two distinct things to describe:—education and morality. Education:—I believe that I received a good foundation at your Institution which prepared me well for a higher

education. Morality :—This is a theme that comes from the pen of a philosopher of broad and long experiences and observations. I am too young to grasp it ; however I will try to tell from my experiences, which, I believe are common to many others. In my opinion morality is a foundation that directs the fate of a nation. The high morality, a great nation. I do trust that the deaf are generally morally good. The teachers and officers at the Institution have behaved themselves well, and have been correcting our conduct very wisely. As a rule the deaf are bearing themselves cheerfully and keeping a clear conscience which is a good armor. They are walking innocently of the dangerous and hardly resisting temptations. I sometimes fancy the Omniscience is benevolent, specially to us as a recompence for our loss of hearing. While at school we were were told point-blank that we can never recover hearing, yet at the same time we were instilled with hope, a valuable and peerless word for the future. It maintains our struggling life through the fierce and dashing battles of the merciless world. We hope we will all get into the promised land at last. With my best regards to yourself and the teacners and officers—yours, etc.

Mrs. Mary A. B., Montreal.—I was a pupil at the Institution at the time Dr. Palmer was the Superintendent, but I think you have now the best Institution in the Dominion. My health has been good and my life happy since I left the Institution. I have 3 children, boys. They are from 10 years old to 4 years old. My husband lost four fingers in 1894 by a meat-chopping machine, but he is still at the same place. We removed here from Toronto in 1891 as my husband lost his work there.

Isabella E. McC., Bracebridge.—We left Hamilton and moved to Muskoka as my father bought a farm close to Bracebridge, so I am very busy doing such work as farmers' daughters do. I would have been a poor creature only for what I learned at the Institution, and will always remember the kindness of Mr. Mathison and also the teachers, and I send my warmest love to you all.

Maggie B., Ottawa.—I feel thankful to you for the instruction I received at the Institution and from you. I shall always try and improve myself in what I have learned. I am helping my aunties to keep the boarding house and sewing with my sister. I like dressmaking pretty well. I was pleased to see some of the teachers from Belleville who were in the city during the summer. I have some deaf friends here whom I often see, and I always enjoy their company. We attend the Y. M. C. A. every second Sunday, and Mr. Bayne addresses us from the Bible. I wish you and the teachers good success at the Institution. Kindly remember me to my old teachers and friends.

Isabella H , Dickenson.—Since leaving the Institution I have been helping my mamma at home, besides doing many other things for myself. I need not tell you that my thoughts are often of you I remember you always treated me with much kindness when I was delicate. I expect soon to leave home for Duncanville, where I expect to work at the trade of tailoring. I can't sufficiently thank God for sending me to school. I can't tell you how thankful I am te you and my teachers when I think that I can read and count, and know what is going on in the world. At the Russell fair I got first prize for the best crazy quilt ; the first prize for the best collection of crochet work ; the first prize for the best hooked mat, and the first prize for the best onions. While I was in Ottawa I attended the meetings in the Y M. C. A. rooms, where Mr. Bayne lectures to the deaf-mutes. I do wish that I was in Ottawa so that I could go and see him often ; but I always read my Bible and good books at home. Kindly remember me to my friends. My ma desires her remembrances to you and Mr. Coleman.

James H. B., Aylmer.—I am thankful to God and you for a good education. Since I left school 17 years ago I have worked for my father part of the time or hired with others, and during winter I have done well at shoemaking. I was married to Lucinda N——, a graduate of the Institution, about four years ago, and we have two boys now. I have lately bought a farm and am very busy.

Alexander L., Garth, Mich.—I left Ford River because the saw-mill and cedar mill were closed down, and came to Garth, where I got g job in the shingle-mill, where I commenced to work on the 13th of May. We expect the mill will close down about next November, when I will return to Ford River on a visit.

Emil and Mrs. Henrietta G., Stratford.—We are glad to know that you are always interested in the deaf-mutes and want to know what they are doing after they have left the Institution. I am a first-class shoemaker, and can do all kinds of work in the shoe factory. I never forget that I learned my trade at the Institution, and I must say that I am thankful to you for it. We never forget you, and we thank you for the education we received at the Institution. We have two smart little sons.

Mrs. Ella S., Northfield Centre.—My health was never better than now. I am married to a good man and I am happy. I feel that I owe a great debt to God and the Ontario Govern-

ment, and also to you and my teachers for my education. David is thankful to you, the officers and the teachers for your kindness to him at school. His health has been good, and he has been working steadily on the cheese-boxes since he left school, over fourteen years ago. I hope you will all be successful this year.

Arthur B., Wilson.—I have been married twelve years, and have two boys aged 11 and 7 years. We own a farm of 150 acres of very good land and we are getting along well financially, but are sorry to say that my health is failing, so I have rented my farm. We think that the education of the deaf a God-send, and it is our united prayer that God may so inspire you as their Superintendent and the teachers of the Institution, that your daily lives may be living witnesses for Christ. I have never forgotten the Bible instruction I received there. I am sure the instruction I received at the Institution has added to my enjoyment and happiness in life. In my married life I am one of the happiest of men, and the little education I received has helped me wonderfully. I send my best regards to the whole school. May good luck and prosperity follow each and every one there.

Robert M., McK., New Durham.—I am farming, and I think that is the best employment for deaf-mutes. I am prospering well. I do not manage my farm, but my pa manages it and I help him to do some work. We have lots of hard work. I am sure the instruction I received at the Institution has made me a better man and added to my enjoyment and happiness in life. I desire to offer my cordial thanks to you, and also to the officers and teachers for their constant kindness in giving me their most valuable assistance. I think of you always since I left the Institution.

Mrs. Robert W., Hartsmere.—Since leaving the Institution I have been married, have one child and am keeping well. I think that the instruction I received did me much good, and has made a great improvement in my life. I send you my best wishes.

David S. L., Perth.—I am enjoying good health and am getting along finely. I like my job in the car shops here first rate. I make $32 00 a month. I board at Jackman's hotel here where Messrs. Patrick, Noonan and O'Brien also board. We are good company for each other. I send my best regards to you and all at the Institution.

Barbara W., Fordwick.—Anna and I moved to Fordwick, and I have been dressmaking since June. I am kept busy. I am sure I will never forget how kind you all were.

Lizzie McM., .—The few years I spent under your care were among the happiest years of my life, and I can never feel too grateful for the instruction I received there. It has not only helped me to lead a better life from what I probably would have led without it, but it has helped me to get along in the world in the way of entirely supporting myself and earning my own living. Since leaving your care I have had many ups and downs and not a few very dark days, but the instruction and care I received at the Institution enabled me to have patience and courage and to try to look on the sunny side, even of the darkest day. I have succeeded pretty well in getting through the battle of life so far. My success, I can truly say, is due to the teaching I received while at school. It has helped me in the past. I know it will sustain me in the future no matter how hard or dark the way may seem. I cannot say too much or feel too thankful for the care and kindness I received while there from you and all connected with the Institution. May it please our Heavenly Father to spare you and others who are helping in the noble work you are doing, for many years to come, that many others like me may learn to appreciate the care, kindness and blessings of our noble Institution, and leave it feeling proud they received their education there.

W. R. W., Guelph.—I feel very thankful to you for your kindness while I was at school. I am working in the "Daily Advocate" printing office here, as the shoe factory in Milton was partly burned last month. The factory is being built again and I think it will be running this month and I will go there soon. The deaf-mutes in this city, ex-pupils of the Institution, are doing well and working steadily. I received my diploma all right, and my parents and sisters were very much pleased with it.

Andrew N., Denfield.—Yes, the instruction I received at the Institution made me a better man. I am working on the farm. I have 100 acres of land and no debt. I sell grain on the market in London myself like a talking man. I am 15 miles from London. I sold wood on the market in St. Marys every winter. If I had no education I could not sell grain and wood. I do all my own business. I am happy and prosperous. Thanking you for all past kindnesses, I remain, etc.

John F. F., Chatham.—I returned from Elkhart, Ind., on the 24th ult. I hadn't been home for nearly two years. I am working at the "Banner" office here again, but do not expect to be kept very long. I am pretty expert at setting type. I have had a good deal of work and money since I left your school, and I should feel very thankful to you for your great kindness in admitting me to school and teaching me. I have no bad habits. I don't smoke or

chew. I hope all the pupils are doing well at school. I wish you success during the school term. May God bless you. I send my best regards to you and all the teachers and pupils.

Mrs. H. M., Toronto.—I thank you for your interest in our welfare. I am very grateful for what I learned at the Institution. I have a comfortable home, and a kind husband and one boy. I hope this will find you and all the pupils well.

Wilfred P. L., Armstrong Lake.—We are well and getting along very well at farming. I have never forgotten you since I left school. I know you are very kind and helpful to deaf-mutes, and I feel very thankful to you. My mother never forgets you for your kindness to me. I am living on my mother's farm here, but I own a homestead which is 1½ miles from here. I have a span of Clyde horses and some young cattle. We sold some cattle this year. I wish some deaf-mutes were living near here. I hope God will bless you and help you to manage the pupils of your school. I give my best love to you, and also to the teachers and officers and pupils.

J. A. G., Toronto.—I have worked for two years at nickle-plating with the Toronto Silver Plate Co., and I am doing well. I have not forgotten you, the teachers or officers since I left the Institution 8 years ago. My mother sends her best regards to you. With my best regards to you, the teachers and officers, I am, etc.

Betty Ann L., Creemore.—I am quite well and still living at home with my mother and brothers. My father was taken from us three years ago. I suppose you thought that I had forgotten you, but indeed I haven't, and I will never forget you.

Thomas A. S., Dickenson.—I am still a farmer and I am doing well. With 100 acres of land and a large stock to look after, I find my time fully occupied. I do not know what I should have done if it had not been for what I learned at your school. I wish I could have had a few more years at it. I had the pleasure of a visit from Mr. McKillop this summer, and I was greatly pleased to meet him. With best wishes to teachers, officers and all former pupils, I remain, etc.

George W. G. and Lizzie G., Souris.—I am farming. Our education has added both enjoyment and happiness to our lives. We are in good health. We send best wishes and regards to you all.

Gertie C. McP., Glen Souris.—Your letter of July 15th came to me all right and I am always pleased to hear from you at the dear old Institution where I spent so many happy days. I am still going to Winnipeg to try and fit myself for life's duties, as my mother thinks I cannot hove too much education. Dear Mr. Mathison, no tongue can tell what benefit I have derived from the instruction I received at the dear old Institution, not only intellectual, but spiritual, turning the darkness into light, and the kindness and patience with which it was imparted to us! How can I thank God enough for the dear ones who work so faithfully for our benefit?

Occupations of our Former Pupils.

I have had several hundred additional letters from which equally satisfactory extracts as the foregoing could be given, but a sufficient number have been put in evidence to show the general confidence of the parents in the management of the school and the gratitude of the old pupils for the training and education received here. As far as can be ascertained the appended list will show the occupations which our former pupils are engaged in :

Artists	3	Domestic servants	8
Bookbinders	5	Domestic occupation	85
Brassfitters	1	Dressmakers	18
Bakers	5	Engravers	1
Bailiffs	1	Fancy workers	1
Butchers	1	Farmers	161
Brushmakers	2	Glass stainers	1
Barbers	1	Gardeners	1
Cigarmakers	2	Ice merchants	1
Copyists	1	Lockmakers	1
Carpenters	7	Lithographers	1
Clerks	3	Lumbermen	1
Cabinetmakers	2	Married	53
Carriagemakers	3	Photographers	2
Coopers	2	Painters	8

Packers	1	Teachers	6
Printers	17	Woodcarvers	2
Sawmill workers	4	Wireworkers	2
Shoemakers	41	Woollenmill workers	4
Seamstress	4	Woodturner	1
Tailors	9	Watchman	1
Teamster	1	Unclassified	105

Many of them are well off, others are in comfortable circumstances, few are a burden on their relatives, and none of them are in gaol as prisoners. As a class generally they are good citizens and enjoy the respect and esteem of the people in the communities in which they reside.

Teachers and Officers.

An additional teacher has been appointed in the Articulation and Lip-reading Department, consequently a greater number of pupils will have instruction in these branches than formerly. Miss Ida M. Jack, a Normal School graduate, and a successful teacher in the public schools, was added to the staff at the beginning of the session. She was especially trained for the work by the late Miss Garrett, of Scranton, Pa., and afterwards taught for several years in the Institution for the Deaf, at Flint, Michigan. Mrs. J. F. Wills, our esteemed teacher of drawing, for three years past, resigned on the 1st of September, as she found she could not give the time to the work any longer. The position vacated has not been filled by any special appointment: drawing is now taught in all the classes the same as is done in the public schools. Mr. M. O'Meara, farmer for eighteen years, resigned on the 1st of July last; his duties were assigned to the gardener and no new appointment made.

Two Cases of Restored Hearing.

During the year two boys whose hearing we found very much improved since coming to us were taken off our list of pupils. These cases were not miraculous cures by any means; both lads when they came, and for a couple of years afterwards were troubled with catarrh, and their heads were stuffed up and their ears clogged with hardened wax to such an extent that they could not hear distinctly, and in one case speech was almost discontinued. By care and attention they became stronger physically, their heads and ears were relieved and they were taught and encouraged to speak at all times. One was sent home to his parents and is now attending the public school; the other, an orphan, was placed in a good home with a farmer near Seaforth, through the instrumentality of the Rev. C. W. Watch, the devoted Superintendent of Canadian Child Saving Work, with headquarters at Brighton, Ontario.

The Industrial Department.

In the Industrial Department the pupils are making commendable progress In the printing office the instructor reports the efficiency and conduct of the boys employed there as very satisfactory. The instructor in the shoe shop says the pupils employed with him are doing well considering the youth of many of them. It has been his aim to keep the new lads steadily employed, placing quality before quantity always, but the advanced apprentices are encouraged to speedy work with good quality as well, so that they may be able to make a living at their trade and give satisfaction to those who employ them after they leave the Institution. The boys in the carpenter shop are also favorably spoken of, and one or

two boys have graduated from the bakery able to take positions as helpers in ordinary bake shops. The girls in the sewing room are doing well under competent instruction; several of them learned to cut and fit dresses and other garments by the aid of patterns, charts, etc., which they are taught to use. The fancy work class continues to be a means of good to the girls enrolled in it.

The Farm and Garden.

The farm, garden, and grounds never looked better than they did this year, and when some contemplated alterations are made, will present some still further improvements. On the resignation of the former farmer the oversight of the whole place was placed in charge of the gardener, and he has carried on the work successfully and systematically. For some years past we have had to purchase considerable feed for our stock, but this year we shall have nearly enough of our own for our needs. With our new silo filled with corn our supply of milk will be greatly in excess of previous years at a less cost. Mr. Moore takes an intelligent interest in the work of the farm and garden, and the greenhouse, flower beds and grounds generally were all well attended to.

Per Capita Cost of Pupils.

Our expenditure on maintenance account for the year ending 30th of September, 1897, was $45,282.70 and $46,032.32 for the previous year, but our per capita cost is $170.22 for 1896-97, as against $169.19 for 1895-96. This slight increase of $1 03 per pupil is accounted for by having a less number of pupils in 1896-97 than in 1895-96, and also by the fact that the tender price of flour and butchers' meat was higher in the latter year than in the former one. The rate is a low one anyway as I find the per capita cost per pupil of other institutions similar to ours to be:

Colorado	$342 00	Pennsylvania	$267 00
New Jersey	304 00	Maryland	266 00
American (Hartford)	300 00	Western Penn	243 00
Central New York	300 00	Minnesota	229 00
Rhode Island (Oral)	293 00	Ohio	226 00
Clarke Institution	292 00	Illinois	205 00
Western New York (Rochester)	289 00	Wisconsin	205 00
New York	279 00	Indiana	203 90
California	278 00	Kansas	187 00

An average of the foregoing is $257. It is a matter for consideration whether we should take credit for our average being so much below the average as given above. Usually the higher the per capita cost the better the school—more teachers, smaller classes and enlarged facilities. We are doing well, however; but we might do better. We aim to make our Ontario Institution more efficient each succeeding year, and second to none anywhere. In every department the utmost economy is practiced, consistent with efficient administration; nothing is allowed to go to waste, neither is there any stinting, more particularly in the food supply, which is good in quality, abundant in quantity, nutritious and well prepared. The cost of the laundry is less than formerly, as instead of selling the refuse fat for a small price it is now made into soap on the premises.

Her Majesty the Queen's Jubilee.

The deaf children in the Institution were not behind the rest of the millions of Her Majesty's loyal subjects in congratulating our Soverign Lady the Queen on the occasion of the sixtieth anniversary of her long and glorious reign. Their address said:—

"We, silent children of the Banner Province, cannot, like the more favored of your Majesty's loyal subjects, join with those whose voices are borne towards heaven, laden with words of thankfulness and joy, but mean, at least, to send over the mighty ocean our humble homage, and beg you, Gracious Queen, to accept the heartfelt congratulations of the pupils of the Ontario School for the Deaf. Though mutes, our hearts can feel as much love and respect for our Sovereign as those of your Majesty's most loyal subjects; and your Majesty's well known interest in deaf mutes so increases these sentiments in us, that it is from the depth of our hearts that we all join in saying: 'God bless our noble Queen and preserve her to us for many more years that we may long enjoy being governed by her kind and gentle sway.'

It was transmitted through His Excellency, Lord Aberdeen, and was kindly acknowledged as per letter herewith:—

Ottawa, July 26, 1897.

Sir,—I am desired by His Excellency, the Governor-General, to inform you that the addresses to the Queen from the pupils of the Ontario Institution for the Deaf and Dumb having been duly laid before Her Majesty, who was deeply touched by them, His Excellency has received Her Majesty's commands to convey through you her sincere thanks to the pupils of the Institution for their good wishes and welcome congratulations.

I have the honor to be, sir,

Your obedient servant,

C. T. Toms,

For the Governor-General's Secretary.

R. Mathison,

Ontario Institution for Deaf and Dumb,

Belleville, Ont.

The General Health.

General good health prevailed during the year which speaks well for the sanitary condition of the buildings. That there were no deaths in a population of over 300 souls is a matter for sincere thankfulness and gratitude to the Giver of all Good who watches over and cares for us. Our remarkable immunity from disease is largely due to the watchful care of our excellent trained hospital nurse, Miss Hale, whose attention to the smaller and multitudinous ailments of our large flock of boys and girls was unremitting at all times. Credit is also deserved by all those whose duty it is to see to the cleanliness of the premises generally.

Newspapers Received.

The publishers of the newspapers hereunder mentioned have our thanks for generously sending copies of their publications to our reading rooms free of charge:

Name.	Where Published.	Name.	Where Published.
Evening Times	Hamilton.	Mercury	Renfrew.
Spectator	Hamilton.	Despatch	Strathroy.
Herald	Hamilton.	Post	Thorold.
The Star	Montreal.	Banner	Dundas.
Daily Free Press	Winnipeg.	Enterprise	Collingwood.
Free Press	Ottawa.	Clinton News	Clinton.
Daily News	Kingston.	Review	Niagara Falls.
Economist	Shelburne.	The Guardian	Uxbridge.
Express	Colborne.	Chronicle	Ingersoll.
Free Press	Acton.	Guide	Port Hope.
Mercury	Guelph.	Courier	Trenton.
Examiner	Peterboro'.	Hastings Review	Madoc

NEWSPAPERS RECEIVED.—*Continued.*

Name.	Where Published.	Name.	Where Published.
Advocate	Trenton.	Palmetto Leaf	Cedar Springs, S.C.
Rural Canadian	Toronto.	Washingtonian	Vancouver, Wash.
Saturday Night	Toronto.	The Weekly News	Berkley, Cal., U.S.
Tribune	Deseronto.	The Messenger	Talladega, Ala., U.S.
Telegraph	Palmerston.	Kentucky Deaf Mute	Danville, Ky., U.S.
Herald	Carleton Place.	Lone Star Weekly	Austin, Texas.
Canadian Churchman	Toronto.	The Mute Journal	Omaha, Neb.
Freeholder	Cornwall.	The Star	Olathe, Kansas.
Leader	Tara.	Desert Eagle	Salt Lake City.
Echo	London.	American Teacher	Boston, Mass.
Enterprise	Colborne.	Rockwood Review	Kingston, Ont.
Reformer	Simcoe.	The Silent Hoosier	Indianapolis, Ind.
Ensign	Brighton.	The Banner	Devil's Lake, N.D.
Sentinel-Review	Woodstock.	Mute's Chronicle	Columbus, Ohio, U.S.
Courier	Embro.	The Advance	Jacksonville, Ill.
Observer	Pembroke.	Dakota Advocate	Sioux Falls, South Dakota, U.S.
Gazette	Almonte.		
Reporter	Kingsville.	Colorado Index	Colorado Springs, Col.
Standard	Markdale.	Missouri Record	Fulton, Mo., U.S.
Enterprise	Arthur.	Progress	Regina, Assa.
Courier	Perth,	The Monitor	Malone, N.Y.
Advertiser	Petrolea.	Silent World	Philadelphia, Pa. U.S.
Albert College Times	Belleville.	Kelly Messenger	Morgantown, N.C.
The Herald	Morden, Man.	Buff and Blue	Kendall Green, Washington, D.C., U.S.
The Imprint	Toronto.	The Western Pennsylvania	Edgewood Park, Pa.
Pointers	Belleville.	The Sign	Salem, Oregon.
Clinton New Era	Clinton.	The Optic	Little Rock, Ark., U.S.
Echo	Belleville.	The National Exponent	Chicago, Ill., U.S.
Mirror	Meaford.	The Idea	Jacksonville, Ill., U.S.
Monitor	Meaford.	Companion	Fairhault, Minn. U.S.
Star	Goderich.	The Educator	Mount Airy. Pa., U.S.
Herald	Campbellford.	Advocate	Malone, N.Y.
The Arrow	Burk's Falls.	The New Method	Englewood, Ill.
Whig	Kingston.	The Pelican	Baton Rouge, La.
Journal	Prescott.	The Voice	Jackson, Miss.
Thunder Bay Sentinel	Port Arthur.	The Silent Observer	Knoxville, Tenn.
The Colchester Sun	Truro, N.S.	The Mirror	Flint, Mich.
Farmer's Sun	Toronto.	The Herald	St. Augustine, Fla.
Silent Echo	Winnipeg, Man.	What Cheer	Providence, R.I.
Deaf Mute Journal	Station "M," New York City.	The Times	Wisconsin, U.S.
Deaf Mute Register	Rome, New York.	The Hawkeye	Council Bluffs, Iowa.
Daily Paper for Our Little People	Rochester, N.Y.	The British Deaf Mute	Bolton, England.
Silent Worker	Trenton, N.J.	Quarterly Magazine	Friar Gate, Derby, England.
Maryland Bulletin	Frederick, Md.	Silent Messenger	Belfast, Ireland.
Goodson Gazette	Staunton, Va., U.S.	Church Messenger	London, Eng.
The Tablet	Romney, W. Va.	Cross School Magazine	Preston, Eng.

NOTE.—The *Canadian Churchman* is generously supplied by the Rev. Canon Burke, of Belleville.

Miscellaneous.

We have an attendance to-day of 271 pupils—118 girls and 153 boys.

The wiring for electric lighting is completed and we are waiting for the main wires from the city to be put up and connected.

The kindness and consideration of the Grand Trunk, Canadian Pacific and Central Ontario Railways to pupils, teachers and officers are again thankfully acknowledged.

Our Institution telephone system was badly damaged by the severe storms prevalent last spring and a complete renovation of it was necessary, which is now under way.

Our Institution re-opened on Wednesday, September 15th, and all the pupils with the exception of three who were detained at home on account of illness answered to the roll call on the morning of the 16th.

The report of A. B. Davidson, B.A., Public Inspector of Schools for York County, the Examiner of the Literary Classes in June last, is on the whole favorable to the thoroughness of the work accomplished here. His timely suggestions will be acted upon and we expect to make as good, if not a better, record next year, as our teachers are faithful, conscientious and persevering.

We are indebted to the following resident clergymen for favoring us with visits and interesting themselves on behalf of the pupils belonging to their denominations:—Rev. Canon Burke, Right Rev. Monseignor Farrelley, V.G., Rev. T. J. Thompson, M.A., (Presbyterian); Rev. Chas. E. McIntyre, (Methodist); Rev. V. H. Cowsert, (Baptist); Rev. M. W. Maclean, (Presbyterian); Rev. Father Connelly, Rev. R. Cade, D.D., (Methodist); Rev. J. J. Rice, (Methodist); Rev. N. Hill, (Methodist).

Officers, teachers and all connected with the Institution have performed their several duties with fidelity and zeal: to them is due the credit in a great measure, for any success attained.

The usual statistical tables are herewith attached.

I have the honor to be, Sir,

Your obedient servant,

R. MATHISON,

Superintendent.

Age of pupils.

Age.	No.	Age.	No.	Age.	No.
7	3	15	41	23	1
8	23	16	17	24	2
9	11	17	23	25	3
10	14	18	13	26	1
11	26	19	9		
12	32	20	6	Total	292
13	27	21	6		
14	33	22	1		

Nationality of parents.

Name.	No.	Name.	No.
Canada	403	United States	9
England	49	Wales	2
France	2	Unknown	52
Germany	15		
Ireland	20	Total	584
Scotland	32		

Religion of parents.

Name.	No.	Name.	No.
Baptist	14	Methodist	108
Brethren in Christ	1	Mennonites	4
Christian	3	Presbyterian	60
Disciples of Christ	1	Roman Catholic	51
Evangelical Church	2	Salvation Army	1
Church of England	42	Unknown	1
Latter Day Saints	1		
Lutheran	3	Total	292

Occupation of parents.

Occupation.	No.	Occupation.	No.
Agent	3	Harnessmaker	2
Axemaker		Housekeeper	2
Blacksmith	5	Hotelkeeper	1
Bookkeeper	1	Lumberman	2
Butcher	2	Laundrymaid	1
Builder	1	Laborer	87
Banker	2	Machinist	4
Baker	1	Mason	3
Bricklayer	5	Minister	1
Barber	1	Merchant	4
Bartender	1	Miller	2
Basketmaker	1	Navigator	1
Carpenter	9	Nurse	1
Caretaker of cemetery	1	Painter	1
Clerk		Printer	1
Conductor	1	Potter	1
Constable	1	Secondhand Dealer	1
Carter	2	Storekeeper	1
Cook	1	Stoker	1
Currier	1	Shoemaker	5
Carriagemaker	1	Steamfitter	1
Dressmaker	1	Teamster	2
Draymaker	1	Teacher	2
Engineer	3	Trapper	1
Farmer	109	Traveller	1
Fruit Dealer	1	Unknown	3
Grocer	2		
Gardener	2	Total	292

Counties from which pupils during the year came.

Counties.	No.	Counties.	No.
Algoma	1	Middlesex	5
Brant	1	Norfolk	4
Bruce	4	Northumberland	7
Carleton	14	Nipissing	1
Cornwall	1	Ontario	2
Durham	1	Oxford	11
Dufferin	1	Parry Sound District	3
Dundas	1	Peel	5
Elgin	4	Perth	7
Essex	9	Peterborough	5
Frontenac	1	Prescott and Russell	11
Grey	10	Prince Edward	2
Hastings	18	Renfrew	10
Haliburton	3	Simcoe	9
Huron	9	Stormont, Dundas and Glengarry	4
Halton	4	Thunder Bay District	1
Haldimand	3	Victoria	6
Kent	13	Waterloo	8
Lambton	14	Welland	4
Lanark	2	Wellington	8
Leeds and Grenville	3	Wentworth	11
Lincoln	2	York	31
Lennox and Addington	14		
Monck	1	Total	292
Muskoka	4		

Total number of pupils in attendance for the session 1896-97.

Males	164
Females	128
Total	292

Counties from which the pupils in residence on the 30th September, 1897, were originally received.

Counties.	Male.	Female.	Total.	Counties.	Male.	Female.	Total.
Algoma District	.....	1	1	Muskoka District	3	1	4
Brant	1	.....	1	Norfolk	2	2	4
Bruce	3	1	4	Nipissing District	1	.....	1
Cornwall	1	.....	1	Northumberland	4	2	6
Carleton	8	6	14	Ontario	1	1	2
Dufferin	.....	1	1	Oxford	7	4	11
Durham	1	.....	1	Peel	2	3	5
Dundas	1	.....	1	Parry Sound District	1	2	3
Elgin	3	1	4	Perth	5	2	7
Essex	5	4	9	Peterboro	2	3	5
Frontenac	1	.....	1	Prescott and Russell	10	1	11
Grey	5	5	10	Prince Edward	1	1	2
Haliburton	3	.....	3	Renfrew	4	6	10
Haldimand	2	1	3	Simcoe	3	6	9
Halton	.....	4	4	Thunder Bay District	.....	1	1
Hastings	12	6	18	Stormont, Dundas and Glengarry	4	.....	4
Huron	4	5	9	Victoria	2	4	6
Kent	9	4	13	Waterloo	6	2	8
Lambton	6	8	14	Welland	3	1	4
Lanark	1	1	2	Wellington	3	5	8
Lincoln	1	1	2	Wentworth	4	7	11
Leeds and Grenville	3	.....	3	York	17	14	31
Lennox and Addington	7	7	14				
Middlesex	2	3	5				
Monck	.....	1	1	Total	.....	.....	292

Number of pupils in attendance each official year since the opening of the Institution.

	Male.	Female.	Total.
From October 27th, 1870, to September 30th, 1871	64	36	100
" 1st, 1871 " 1872	97	52	149
" 1872 " 1873	130	63	193
" 1873 " 1874	145	76	221
" 1874 " 1875	155	83	238
" 1875 " 1876	160	96	256
" 1876 " 1877	167	104	271
" 1877 " 1878	166	111	277
" 1878 " 1879	164	105	269
" 1879 " 1880	162	119	281
" 1880 " 1881	164	132	296
" 1881 " 1882	165	138	303
" 1882 " 1883	158	135	293
" 1883 " 1884	156	130	286
" 1884 " 1885	168	116	284
" 1885 " 1886	161	112	273
" 1886 " 1887	151	113	264
" 1887 " 1888	156	109	265
" 1888 " 1889	153	121	274
" 1889 " 1890	159	132	291
" 1890 " 1891	166	130	296
" 1891 " 1892	158	127	285
" 1892 " 1893	162	136	298
" 1893 " 1894	158	137	295
" 1894 " 1895	160	135	295
" 1895 " 1896	173	137	310
" 1896 " 1897	164	128	292

Ages of pupils admitted since the opening of the Institution.

Ages.	No.	Ages.	No.	Ages.	No.
4	1	15	60	25	5
6	24	16	42	26	5
7	155	17	41	27	3
8	161	18	36	30	1
9	126	19	27	36	1
10	82	20	20	Unknown	15
11	88	21	11		
12	72	22	12		
13	67	23	6		
14	46	24	6	Total	1,113

Nationality of parents of pupils since the opening of the Institution.

Name.	No.	Name.	No.
Bohemia	2	Prussia	2
Canada	1,040	Scotland	246
England	297	United States	41
France	3	Wales	5
Germany	74	Unknown	217
Indian	3		
Italy	2	Total	2,226
Ireland	294		

Religion of parents of pupils since the opening of the Institution.

Name.	No.	Name.	No.
Baptist	71	Lutheran	23
Bible Christian	11	Latter Day Saints	1
Believers	1	Methodist	313
Congregational	6	Mennonites	13
Christian Church	2	New Jerusalem Church	2
Church of Christ	2	Presbyterian Church	274
Disciples of Christ	2	Plymouth Brethren	2
Evangelical Church	1	Roman Catholic	171
Evangelical German	3	Salvation Army	1
Evangelical Union	1	United Brethren	1
Church of England	191	Unknown	19
Friends	1		
Jew	1	Total	1,113

Occupation of parents of pupils admitted since the opening of the Institution.

Occupation.	No.	Occupation.	No.
Accountant	2	Harnessmaker	3
Agent	8	Housekeeper	3
Axemaker	2	Hotelkeeper	3
Baggageman	1	Ironmaker	
Baker	4	Keeper of park	1
Blacksmith	24	Laborer	222
Boarding-house keeper	1	Livery proprietor	3
Barber	1	Laundry maid	1
Boilermaker	1	Lumberman	7
Bookkeeper	5	Miller	6
Brakesman	1	Millwright	2
Bricklayer	5	Miner	1
Butcher	4	Minister	2
Brickmaker	2	Moulder	2
Brewer	2	Machinist	7
Builder	1	Manufacturer of soda water	1
Barrister	1	Malster	1
Banker	2	Marblecutter	2
Basketmaker	1	Mason	8
Brassfinisher	1	Manufacturer, agricultural implements	2
Carter	2	Mechanic	2
Cabdriver	2	Merchant	19
Cabinetmaker	2	Non-commissioned officer	1
Captain of schooner	1	Navigator	1
Carder	1	Nurseyman	1
Car Inspector	1	Nurse	1
Constable	1	Painter	10
Cooper	4	Printer	1
Currier	5	Peddler	1
Charwoman	1	Potter	1
Carpenter	38	Storekeeper	2
Carriagemaker	6	Steamfitter	1
Cheesemaker	1	Shoemaker	10
Civil Service	1	Stagedriver	1
Clerk	5	Switchman	1
Contractor	1	Stoker	1
Conductor, railway	3	Sailor	1
Cigarmaker	1	Tavernkeeper	9
Dealer in hides	1	Trapper	1
Drayman	4	Tailor	1
Dressmaker	4	Teacher	10
Doctor	2	Teamster	6
Engineer	6	Trader	2
Engineer, railway	3	Weaver	1
Farmer	477	Watchman	1
Fire Insurance Inspector	2	Wagonmaker	1
Fisherman	3	Washerwoman	2
Fruit Dealer	1	Unknown	92
Grocer	2		
Gaoler	1	Total	1,113
Gardener	3		

Counties from which pupils came since the opening of the Institution.

Name.	No.	Name.	No.
Addington	4	Muskoka	14
Algoma District	6	Monck	2
Brant	26	Norfolk	23
Bruce	31	Northumberland	25
Bothwell	1	Nipissing	2
Carleton	48	Ontario	26
Cornwall	2	Oxford	28
Durham	20	Perth	50
Dundas	10	Prince Edward	8
Dufferin	4	Peel	13
Elgin	25	Peterboro	15
Essex	27	Parry Sound	6
Frontenac	18	Prescott	8
Grenville	8	Russell	19
Grey	41	Renfrew	27
Glengarry	7	Simcoe	41
Hastings	52	Stormont	11
Huron	53	Thunder Bay District	1
Haldimand	7	Victoria	15
Halton	14	Wentworth	36
Haliburton	3	Welland	11
Kent	37	Wellington	35
Lincoln	8	Waterloo	10
Leeds	17	York	80
Lambton	37	Province New Brunswick	1
Lennox	18		
Lanark	16	Total	1,113
Middlesex	46		

Causes of deafness.

Cause.	No.	Cause.	No.
Abscess	5	Gathering of the ears	8
Accident	9	Gathering of the head	8
Affection of the ears	5	Inflammation of the brain	12
Bronchitis	4	" " ears	5
Bealing	1	" " lungs	4
Burns	1	" " pulmonary organs.	2
Catarrh	5	Inflammation of the spinal organs	3
Canker	1	Measles	37
Crebro-spinal meningitis	24	La grippe	2
Cholera	1	Mumps	6
Cold	43	Paralytic stroke	1
Congenital	433	Rickets	1
Congestion of the brain	7	Scabs	1
Diptheria	7	Scald	1
Dysentery	2	Scrofula	1
Drank carbolic acid	1	Scald head	4
Eczema	1	Sore throat	1
Falls	22	Shocks	5
Fever, rheumatic	1	Sickness undefined	27
" bilious	5	Spinal disease	48
" brain	28	Swelling on the neck	1
" intermittent	2	Teething	..
" scarlet	77	Vaccination	18
" spinal	21	Water on the brain	7
" malarial	2	Whooping cough	15
" typhus	5	Worms	6
" typhoid	10	Cases unknown and undefined	129
" undefined	26		
Fits	10	Total	1,113

Date of deafness after birth.

——	No.	——	No.
Under 1 year of age	120	Between 10 and 11 years	5
Between 1 and 2 years	132	" 11 " 12 "	2
" 2 " 3 "	117	" 12 " 13 "	3
" 3 " 4 "	63	" 13 " 14 "	4
" 4 " 5 "	40	" 14 " 15 "	2
" 5 " 9 "	29	Unknown at what age they lost their hearing, but not born deaf	121
" 6 " 7 "	14	Congenital	434
" 7 " 8 "	15		
" 8 " 9 "	3		
" 9 " 10 "	9	Total	1,113

Relationship of parents.

First cousins	57
Second cousins	25
Third cousins	20
Distantly related	26
Not related	957
Unknown	38
	1,113

Number of deaf mute families represented.

2	families	contained	5	10
5	"	"	4	20
14	"	"	3	42
71	"	"	2	142
899	"	"	1	899
				1,113

MINISTER OF THE GOVERNMENT IN CHARGE:

THE HON. E. J. DAVIS, TORONTO.

GOVERNMENT INSPECTOR:

DR. T. F. CHAMBERLAIN, TORONTO.

OFFICERS OF THE INSTITUTION:

R. MATHISON, M. A. ..... *Superintendent.*
A. MATHESON ..... *Bursar.*
J. E. EAKINS, M. B. ..... *Physician.*
MISS ISABEL WALKER ..... *Matron.*

TEACHERS:

D. R. COLEMAN, M A. ..... *Head Teacher.*

P. DENYS.
JAMES C. BALIS, B.A.
D. J. MCKILLOP.
W. J. CAMPBELL.
GEO. F. STEWART.
MRS. J. G. TERRILL.
MISS S. TEMPLETON.

MISS M. M. OSTROM.
MISS MARY BULL.
MISS FLORENCE MAYBEE.
MRS. SYLVIA C. BALIS.
MISS ADA JAMES.
MISS GEORGINA LINN.

Teachers of Articulation:

MISS IDA M. JACK. | MISS CAROLINE GIBSON.

MISS MARY BULL ..... *Teacher of Fancy Work.*

MISS N. L. METCALFE ..... *Clerk and Typewriter.*
WM. DOUGLASS ..... *Storekeeper & Associate Supervisor.*
G. G. KEITH ..... *Supervisor of boys, etc.*
MISS M. DEMPSEY ..... *Seamstress, Supervisor of Girls, etc.*
MISS S. A. HALE ..... *Trained Hospital Nurse.*
JOHN T. BURNS ..... *Instructor of Printing.*
WM. NURSE ..... *Master Shoemaker.*
J. MIDDLEMASS ..... *Engineer.*
JOHN DOWRIE ..... *Master Carpenter.*
D. CUNNINGHAM ..... *Master Baker.*
JOHN MOORE ..... *Farmer and Gardener.*

List of Pupils in the Ontario Institution for the education of the Deaf and Dumb for the year ending September 30th, 1897, with the Post Office address.

Counties.	P. O. Address.
Algoma District	
Atkins, Mary E	Port Lock.
Brant	
Randall, Robert	Paris.
Bruce	
Doyle, Francis E	Dobbington.
Lobsinger, Alexander	Mildmay.
Nicholls, Bertha	Kinlough.
Yager, Norman	Chesley.
Carleton	
Cyr, Thomas	Ottawa.
Dubois, Joseph	"
Green, Minnie May	Diamond.
Holt, Gertrude M.	Ottawa.
Henault, Charles	"
Henault, Honore	"
Lemadeleine, M. L. J	"
Lett, Thomas B. H.	Carp.
Lett, William P	"
Larabie, Albert	Ottawa.
McBride, Annie Jane	Kinburn.
O'Connor, Mary B	Ottawa.
Parrent, Sophie	"
Levesque, Joseph	"
Cornwall	
Kirk, John A	Cornwall.
Durham	
Coolidge, Herbert	Hampton.
Dufferin	
Fleming, Eleanor F	Hockley.
Dundas	
Smith, Alfred	Morrisburg.
Elgin	
Cornish, William	St. Thomas.
Henderson, Annie M	Talbotville Royal.
Smuck, Lloyd	Aylmer.
Wickett, George W	"
Essex	
Ball, Fanny S	Windsor.
Bain, William	"
Fairbairn, Georgina	"
Kaufmann, Vesta	Kingsville.
Little, Grace	Windsor.
Munro, George R	Walkerville.
Maitre, James	Elmstead.
Quick, Angus R	Pelee Island.
Rebordie, William	Windsor.
Frontenac	
Watts, David Henry	Portsmouth.

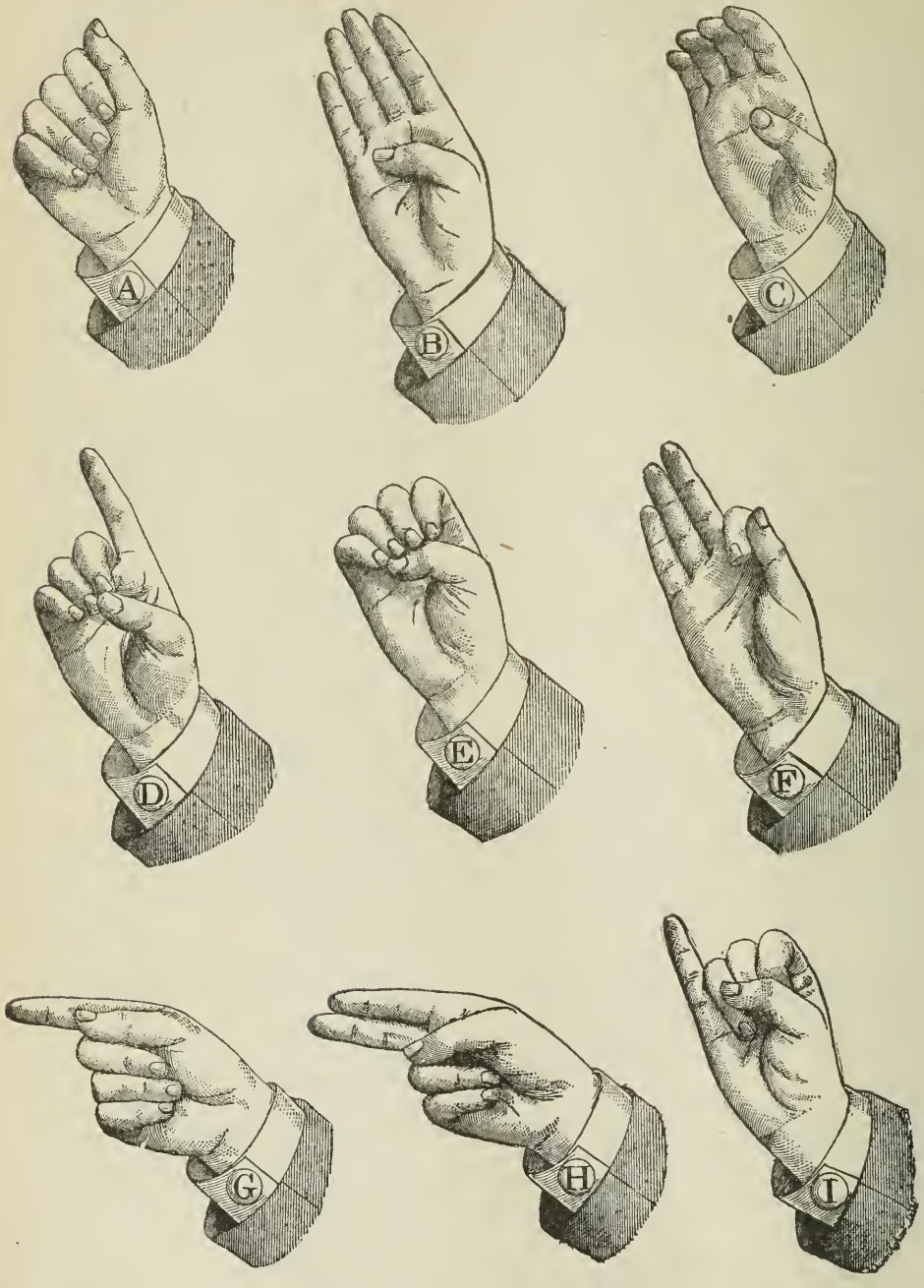
Counties.	P. O. Address.
Grey	
Brown, Sarah R	Peabody.
Brown, Mary Louisa	"
Brackenborough Robert.	Feversham.
Carson, Hugh R	Meaford.
Dewar, Jessie	Owen Sound.
Dand, William T	Lady Bank.
Fleming, Daniel	Craigleith.
Love, Joseph F	Hopeville.
Myers, Mary T	Lady Bank.
McGuire, Lily Edna	Kinghurst.
Glengarry	
Gordon, Daniel George E.	Bridge End
Hastings	
Blackburn, Annie	Coe Hill.
Baragar, George H	Maynooth.
Branscombe, Florence	Frankford
Dool, Thomas	Belleville.
Dool, Charles Craig	"
Farnham, Leona	Canifton.
Gerow, Daniel	Belleville.
Gordon, Kathleen	"
Hill, Florence	"
Holton, Charles McK	"
Keiser, Benjamin	Trenton.
Lowry, Charles	Bridgewater.
McMaster, Robert	Belleville.
Scrimshaw, James H	Big Springs.
Vance, James H	Bancroft.
Wylie, Edith	Marmora.
Young, George S	Hazzard's Corners
Young, Arthur	" "
Haliburton	
Orser, Orval E	Wilberforce.
Otto, Charles E	Haliburton.
Rooney, Francis P	Kinmount.
Huron	
Burtch, Francis	Gorrie.
Cole, Amos B	Clinton.
Gies, Albert E	Zurich.
Leigh, Martha	Port Arthur.
Laporte, Leon	Drysdale.
McKay, Mary Louisa	Moncrieff.
Thompson, Mabel W	Dungannon.
Thompson, Ethel M	"
Thompson, Beatrice	"
Halton	
Cunningham, May A	Oakville.
Gillieland, M	"
James, Mary T	Kilbride.
Smith Maggie	Acton.

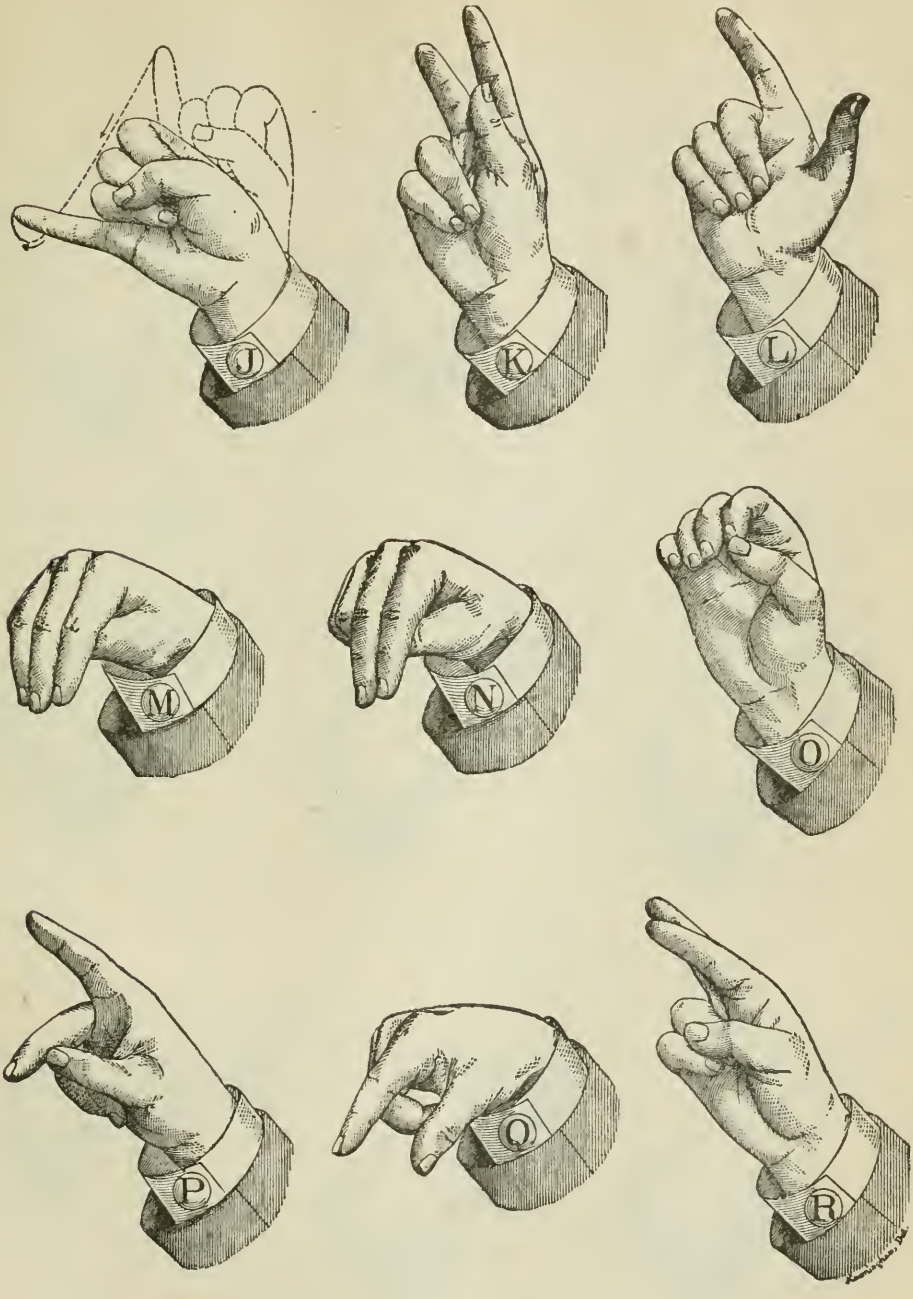
Counties.	P. O. Address.
Haldimand—	
Armstrong, Jarvis E	Jarvis.
Johnston, Anetta	Tynside.
Roberts, Herbert	Jarvis.
Kent—	
Cartier, Melvin	Chatham.
Dale, Minnie Bembridge.	"
Henry, George	"
Leguille, Marie	"
Leguille, Gilbert	"
Lowes, George C	Kent Bridge.
Mosey, Ellen	Fargo.
McGregor, Maxwell	Ridgetown.
Wilson, Herbert	Chatham.
Welch, Herbert	Bothwell.
Beno, Richard	Tilbury.
Deary, Joseph	Highgate.
Vince, Mary Ann.	Fletcher.
Lambton—	
Babcock, Ida E	Petrolea.
Bissell, Thomas E	Sarnia.
Esson, Margaret	Oil Springs.
Harper, William	Warwick West.
Mason, Lucy E	Forest.
Moore, George H	"
McLellan, Norman	Watford.
Scott, Henry P	Forest.
Showers, Annie	Shetland.
Showers, Christina	"
Showers, Mary	"
Showers, Catherine	"
Watts, Grace	Thedford.
Jackson, Elroy	Oil Springs.
Lanark—	
McKay, Thomas John	Middleville.
Noonan, Maggie	Harper.
Leeds and Grenville—	
Annable, Alva	Prescott.
Crowder, Vascoe	do.
Countryman, Harvey B.	do.
Lincoln—	
Bracken, Sarah M	St. Catherines.
Duncan, Walter	do.
Lennox and Addington—	
Barnett, Elmer	Sydenham.
Grooms, Harry E	Napanee.
Hartwick, Olive	do.
Hartwick, James H	do.
Reid, Walter E	Emerald.
Sager, Mabel Maud	Napanee.
Sager, Phœbe Ann	do.
Sager, Matilda B	do.
Sager, Hattie	do.
Sedore, Allen	Roblin.
Sedore, Fred	do.
Barnett, Gerald	Sydenham.
Walker, Lillie	Plevna.
Sedore, Bertha	Roblin.

Counties.	P. O. Address.
Muskoka District—	
Croucher, John	Huntsville.
Durno, Archibald.	Bracebridge.
Gladiator, Isabella	do.
Ireland, Louis E	do.
Monck—	
Young, Rosetta	Dunnville.
Middlesex—	
Mitchell, Colin	Alvinston.
Pepper, George	London.
Russell, Mary Bell	Ailsa Craig.
Scott, Elizabeth	Moray.
Teskey, Lulu	London.
Norfolk—	
Boomer, Duncan	Windham Centre.
Harris, Frank E	Simcoe.
Pierce, Cora May	Delhi.
Swayze, Ethel	Tilsonburg.
Northumberland—	
Bellamy, George	Wicklow.
Cullen, Arthur E	Cobourg.
Chatten, Elizabeth	Hilton.
Cummings, Bert	Norham.
Rutherford, Jessie May	Castleton.
Warner, Henry	do.
Nipissing District—	
Moore, William H	Mattawa.
Ontario—	
Goose, Fidelia	Scugog.
Kelly, James	Uptergrove.
Oxford—	
Barnard, Fred	Tilsonburg.
Cone, Benjamin D. C	Woodstock.
Chantler, Fanny	do.
Chantler, Thomas	do.
Elliott, Cora	Ingersoll.
Elliott, Wilbur	do.
French, Charles	Tilsonburg.
McKenzie, Angus	Tavistock.
McKenzie, Margaret	do.
Perry, Alge Earl	Woodstock.
Skillings, Ellen	Kintore.
Peel—	
Dixon, Ethel Irene	Elmbank.
Duke, Ette	Mono Mills.
Henderson, Clara	Bolton.
Jones, Samuel	Palgrave.
Zimmerman, John C	do.
Parry Sound District—	
Veitch, Margaret	Spence.
Veitch, James	do.
Veitch, Elizabeth	do.
Perth—	
Clements, Henry	Listowel.
Cathcart, Cora	St. Mary's.
Leslie, Edward A	Listowel
Orth, Elizabeth	Shipley.
Orr, James P	Milverton.
Pringle, Murray Hill	Staffa.
Harris, Carl	Mitchell.

Counties.	P. O. Address.
Peterborough—	
Crough, John E	Peterborough.
Derocher, Mary Ellen	do.
Lawson, Albert E	do.
Pilling, Gertie	do.
Harper, Marion	do.
Prescott and Russell—	
Bourdeau, Benoni	Longtinville.
Charbonneau, Leon	Lefaivre.
Delaney, James	Sarsfield.
Forgette, Harmudas	South Casselman.
Forgette, Joseph	do.
Forgette, Marion	do.
Gelineau, Arthur	Pendeton.
Labelle, Maxime	St. Albert.
Laniell, Cleophas	Lefaivre.
Pilon, Althanese	Rockland.
Simpson, Alexander	Piperville.
Prince Edward—	
Head, Hartley	Milford.
McCormick, May Pearl	Mountain View.
Renfrew—	
Brazier, Eunice	Combermere.
Corrigan, Rose Ann	Rochefort.
Moore, Rose Ann	Pembroke.
Moore, Walter B	Renfrew.
Munroe, Mary	Pembroke.
Munroe, John	do.
McBride, Hamilton	Westmeath.
Reilly, Mary	Pembroke.
St. Louis, Elizabeth	Perrault.
Tracey, John M	Pembroke.
Simcoe—	
Bartley, John S	Barrie.
Clemenger, Ida	Creemore.
Hammell, Henrietta	Tottenham.
Lougheed, William J. S.	Allandale.
McKenzie, Herbert	Severn Bridge.
Tudhope, Laura May	Orillia.
Woods, Alberta May	Wyevale.
Watson, Mary L	Orillia.
Webb, Rosey Ann	Creemore.
Stormont, Dundas and Glengarry—	
Benoit, Rosa	Crysler.
Ford, Charles Ray	Elma.
King, Joseph	South Lancaster.
Thunder Bay District—	
Burk, Elsie	Port Arthur.
Victoria—	
Brown, Eva Jane	Valentia.
Elliott, Mabel V	Fenelon Falls.
Mapes, John M	Lindsay.
Justus, Ida May	Bobcaygeon.
Rutherford, Emma	Fenelon Falls.
Wallace, George	Coboconk.
Waterloo—	
Gardiner, Dalton	Berlin.
Nahrgang, Allen	New Hamburg.
Ronald, Eleanor F	Ayr.
Roth, Edwin	New Hamburg.
Schwartzentruber, Catherine	Petersburg.
Siess, Albert	Berlin.
Hagen, William	do.
Walter, John Thomas	Hawkesville.
Welland—	
Shilton, John	Niagara Falls.
Tossell, Harold	do.
Wilson, M. P	do.
Young, Sarah Ann	Brookfield.
Wellington—	
Brown, Wilson	Marsville.
Billing, William E	Monticello.
Goetz, Sarah	Guelph.
Goetz, Eva	do.
Howitt, Felicia	do.
Lyons, Isaiah	Mt. Forest.
Clark, Adeline R	Guelph.
Kraemer, Johana	Macton.
Wentworth—	
Carter, Stella Jane	Bartonville.
De Bellefeuille, Aline	Hamilton.
Fretz, Beatrice	Grimsby.
Gillam, Walter	Grimsby.
Hackbusch, Ernest	Hamilton.
Major, Edith Ella	do.
Morton, Robert	Everton.
Miller, Annie	Hamilton.
Taylor, Joseph	Dundas.
Woodley, Elizabeth	do.
Gummo, Gertrude	Hamilton.
York—	
Allendorf, Anna	Toronto.
Allen, Ethel	do.
Arnall, George	do.
Burke, Edith	do.
Burke, Mabel	do.
Cunningham, Martha	do.
Edwards, Stephen	do.
Ensminger, Robert	Markham.
Ensminger, Mary	do.
Grey, William	Toronto.
Grey, William E	do.
Grey, Violet	do.
Green, Thomas	Carleton.
Jaffray, Arthur	Toronto.
Lightfoot, William	do.
Law, Theodore	do.
Muckle, Elizabeth	do.
Muckle, Grace	do.
Miller, Jane	do.
McCarthy, Eugene	Wychwood.
O'Neill, Ignatius David	Toronto.
Pinder, Clarence	Davenport.
Perry, Frederick R	Eglinton.
Shannon, Annie	Weston.
Scott, Evan	Toronto.
Thomas, Maud	do.
Terrell, Frederick	do.
West, Francis	Queensville.
Waters, Marion	Toronto.
Walton, Allan	Wexford.
Moss, Susan Maud	Toronto Junction.

THE SINGLE-HAND ALPHABET.

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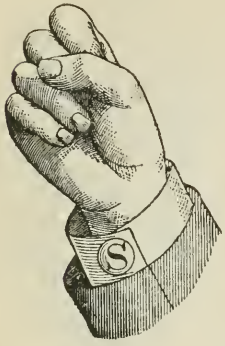
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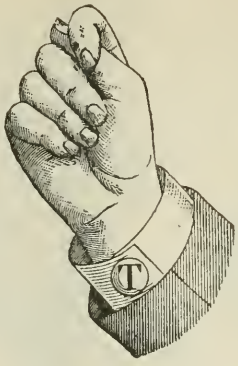
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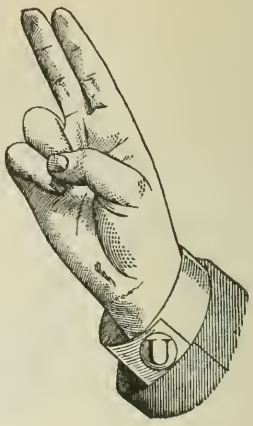
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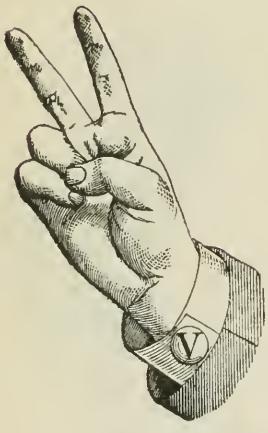
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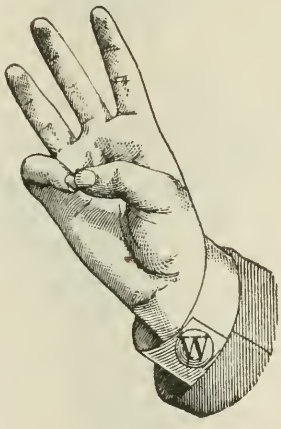
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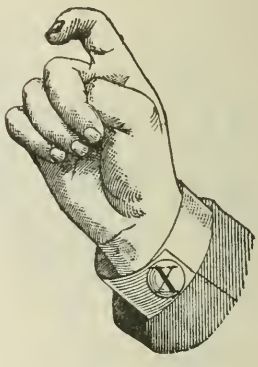
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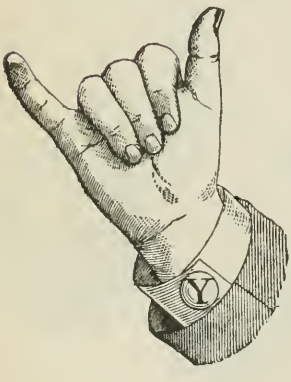
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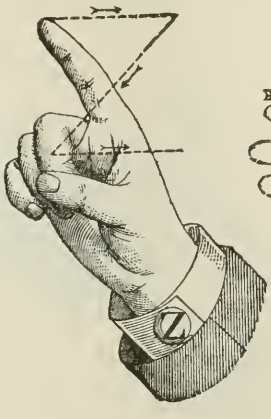
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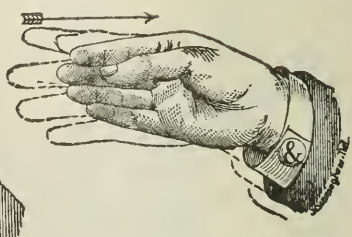
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T. F. Chamberlain, Esq., M. D.,

Inspector of Prisons and Public Charities, Ontario.

Sir,—In submitting a report of the Institution of the Deaf and Dumb, for the year ending September 30th, 1897, it affords me more than ordinary pleasure. The statement that the health of the officers and pupils was better than any preceding year—that there were no deaths occurred—the general health was of higher standard—and no severe epidemics prevailed.

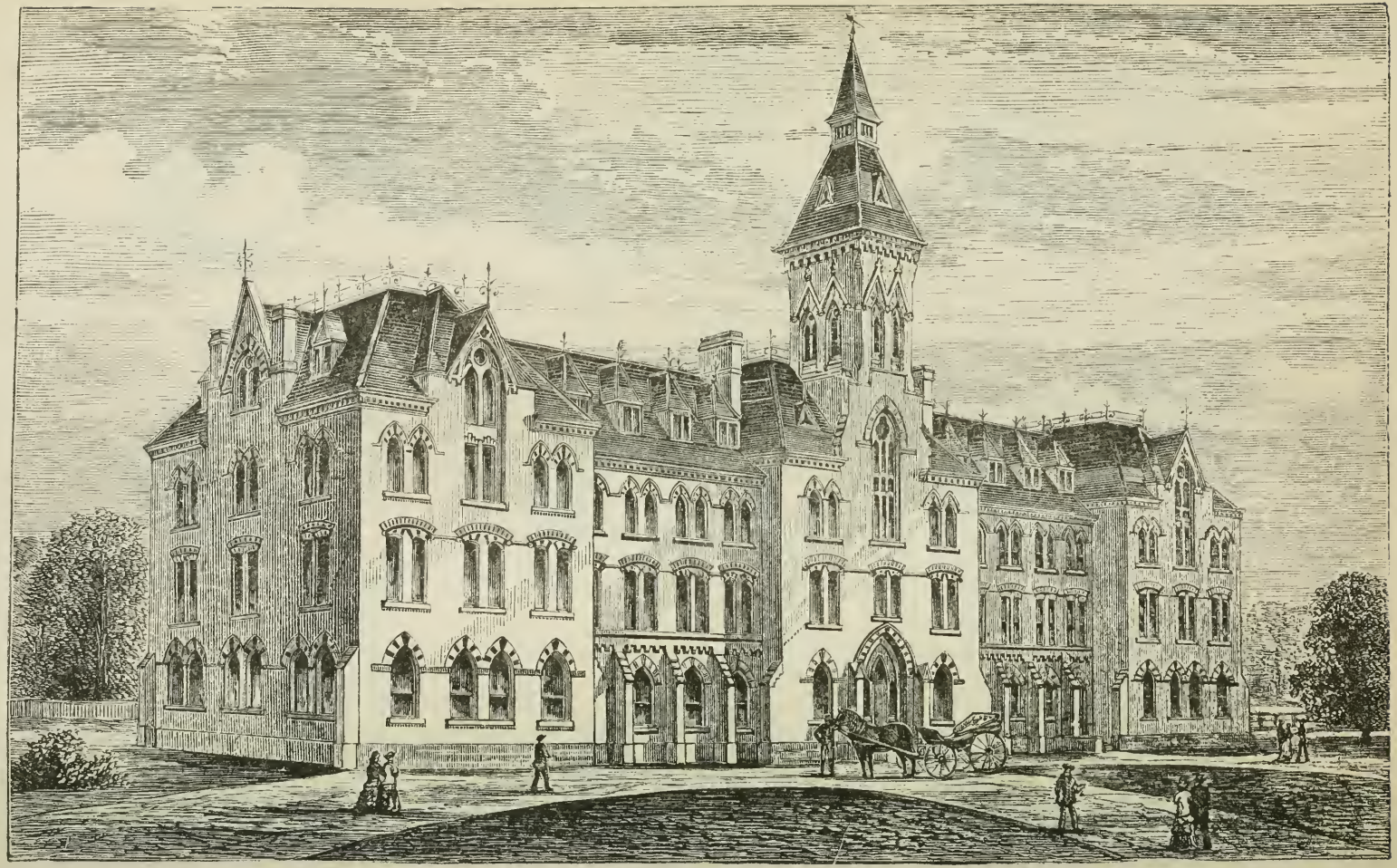
Our location so beautiful, surroundings so pleasant, atmosphere so pure and bracing—are largely productive in securing such a desirable sanitary condition. Not only such environments, but the management of the pupils on the part of the officers and teachers, is greatly conducive to such an elysium. While I speak of this satisfactory sanitary condition, our work was quite constant, in watching and caring for the health of the pupils, seeking that highest goal of medical and surgical art—the zenith of our ambition—the prevention of disease. The usual cases of cold, pneumonia, erysipelas, injuries, etc., were not of any severe type. With the exception of one boy, Thos. B. Lett, who met with a serious accident to his right arm on June 12th, a few days before close of school. Fortunately he was able to proceed home with the other children. I might mention twenty cases of chicken-pox were developed during the year.

The medical supervision of such a large number of children as is congregated in our Institution, brought from city, town, hamlet and outlying districts—from homes of strong contrast, affords a peculiar field of observation. Their minds less early developed—as yet dormant we may say—they complain little in the early stage of disease—hence the keen observation of a nurse becomes a beneficial factor in anticipation of their needs.

I have the honor to be, sir,

Your obedient servant.

Belleville, October 11th, 1897. J. E. EAKINS, M. B.



ONTARIO INSTITUTION FOR THE DEAF AND DUMB, BELLEVILLE.

REPORT OF LITERARY EXAMINER.

T. F. Chamberlain, M. D.,

Inspector of Prisons and Public Charities, Ontario.

Sir,—I herewith present my report on the literary work of the Belleville Institute for the Deaf and Dumb, together with the results of the promotion examination conducted by the staff in May, 1897.

The Teaching Staff.

The number on the regular staff is 15, of whom 9 are ladies and 6 gentlemen. Two of the gentlemen have received a special training in College, and several have received their training in the Normal School.

The educational training of every member of the staff has been amply sufficient to qualify them for the efficient discharge of their duties. The time devoted to instruction each day is not as long as in the Public Schools, but the work is very much more motonous and exhausting. Really good work cannot be accomplished by a teacher unless it is daily entered into in a spirit of devoted earnestness.

Great care and good judgment must have been exercised by the Superintendent in the selection of a staff of such general excellence. The classification of the staff is as follows: First Class 10, work excellent; Second Class 3, work good: Third Class 2, work fair.

In examining the answer-papers written by the pupils at the examination conducted by the teachers on the work of the term, I found that the work had been carefully done by the pupils and very carefully corrected by the teachers.

On comparing the marks obtained in my examination with those obtained in the teachers', I found a remarkable agreement, shewing that the results of the teachers' examination deserve the utmost confidence of the Superintendent as a basis in making promotions from class to class.

The Course of Study.

The course of study covers a period of seven years, and is framed to supply the peculiar want of the pupils, namely: A ready and easy expression of their thoughts in writing and by means of manual signs. Every exercise in the school room, from the lowest class to the highest, is primarily an exercise in English. To the mute, English is an unknown language, and as it is the only medium by which he can attain a knowledge of anything else taught in the school room, more than three-fourths of his time is devoted to the acquisition of a knowledge of it. The course at the commencement is necessarily very narrow, and as the pupil's vocabulary increases it becomes wider, until in the highest class it includes Arithmetic, Composition, Canadian History, Geography and Penmanship. During the last ten years the courses of study have been very much extended in the Public and High Schools, adding thereby to the educational privileges of the youth of the Province. From the number in attendance in the highest classes here, the excellent character of the work done, their exceeding great desire to become intelligent, and the fact that they are handicapped in the race of

life, it does seem to me that in simple justice, not to speak of pity, an extension should be made in this Institution to their privileges, by extending their course of study for at least one year in the meantime, and providing them with another teacher. Why should these afflicted ones be excluded from any share in the educational benefits which have been so liberally bestowed on their brothers and sisters throughout the Province ?

Pupils.

The number of pupils in the school is 264, the sexes being nearly equal in number and ranging in age from 8 to 21. Their conduct in the class rooms was all that could possibly be desired. The earnestness with which they applied themselves to their exercises, even the very youngest, was quite remarkable. The relations existing between the teachers and pupils seemed in all cases to be of the most harmonious character. The teachers treated them with great kindness, and the pupils shewed every mark of respect for their teachers.

The arrangement of their work on slates and paper was, speaking generally, good. The character of the writing in the junior rooms seems to me to be capable of much improvement. The simplest way to accomplish this would be to request the teachers, in all blackboard work, of which there is much more than in an ordinary school, to write only in a simple, distinct and vertical hand, avoiding all fancy work. A vertical hand that secures simplicity and distinctness in each letter and rapidity in execution. The mute has to associate the finger sign, the written sign and the object together. If each member in this group is distinct and clear, the memory will act forcibly and the whole mind with confidence, and thereby aid the pupil very much in the formation and retention of his associations The blackboard work of a teacher in a Mute School is of very great importance as a means of mental discipline and an aid to thought, and should receive from him peculiar care.

Instruction in drawing is given twice a week by a lady who had attended the Provincial Art Classes. The pupils are comparatively few, and are selected from all the classes according as they manifest any taste for the subject. The books in use are those prescribed for the Public Schools. The subject is taught with a view to artistic effects, not educational, as it should be for such pupils. The books were prepared primarily for educational purposes, and can be used to advantage for these only. Drawing should be taught by the regular teacher, and taught so as to educate.

It is a maxim that methods in educational training are of much more importance than the facts acquired, that the process determines the mental character, not the results. The methods of instruction in Mute Schools is necessarily objective from first to last. The same is true of the Kindergarten. This arises from the fact that the mental condition of both ore nearly alike with reference to their studies. Considering the importance of method and the identity of meth ds in general in the Mute and Kindergarten Schools, teachers in Mute Schools should be required to make themselves familiar with the methods of the Kindergarten, more especially the teachers in the lower grades. In the School for Mutes provided by the State of New York, 420 receive instruction by Kindergarten methods out of an attendance of 1,528 pupils. In New Jersey, 27 out of an attendance of 133.

Articulation Classes.

The object of articulation instruction is to enable pupils, by observing the action of the organs of speech of the teacher, to understand what the teacher says and by imitating the facial movements of the teacher, to say the same things. By this method of oral instruction a large percentage of mutes, if instruction is received early in life, can acquire the power of intelligently reading the lips of others, especially of those with whom they may happen to be living, and of expressing themselves so as to be easily understood by any one. In order to realize the value and importance of this branch of instruction it is necessary to see and to hear the advanced classes reading stories and conversing with their teacher. In my opinion an additional teacher is very much needed in this department. In this I find I am in accord with the practice of the best institutions for the Deaf and Dumb in the United States. From the following statistics for 1894-5, you will readily see how much more liberally they have provided for oral instruction in the following state institutions:

—	Total No. of Pupils.	No. of pupils in articulation class.	Percentage.	No. of teachers.	No. for each teacher.
Belleville	264	46	17	1	46
Connecticut	181	127	70	4	31
New York	1,528	818	53	85	10
New Jersey	133	60	45	4	33
Pennsylvania	826	481	58	47	10

In the above four institutions over one half the pupils receive oral instruction, while in Belleville about one sixth. In Belleville the pupils are divided into seven classes. Each pupil has only 6 minutes a day of direct instruction from the teacher, or half an hour per week. When you think of the method, namely, the observation and imitation of the lips of the teacher, you can easily see that the opportunity of pupil and teacher is so brief as to make the best results impossible of attainment. Were an additional teacher appointed, classes could be arranged so that each pupil might obtain instruction from both teachers and in this way become more proficient in the art by learning to read from the lips of two teachers instead of one.

I have pleasure in bearing testimony to the excellent work done by the present teacher, Miss Gibson, and I hope she may soon obtain assistance in her delicate and arduous duties.

Accommodation and Equipment.

The school rooms are too small, even if the ventilation were good, but since the rooms can be ventilated by the windows only, you can readily understand the inconvenience and danger in winter attending this method, especially to the pupils seated near the windows, and how much extra care is thrown upon the teachers in attending to ventilation.

The blackboards are excellent in quality and sufficient in area, but are divided into inconveniently small panels. Were the large wooden frames removed and the stones properly placed in the walls, their value would be doubled to pupils, and their convenience to teachers increased. In nearly all the rooms they were well arranged as to height and the eyes of the pupils.

The desks and seats, though not the best, are fairly convenient and reasonably comfortable.

The supply of slates, maps, wall pictures and other necessaries of the school room is good.

The daily exercises of the school room are happily supplemented with an excellent selection of books, numbering 653, entitled the Allen Kelly Library. Through the care of the Superintendent suitable school texts in English history, language, etc., have been provided, all of which are available to the pupils, and are designed to stimulate and encourage them to read and inform themselves in their leisure time.

I have the honor to be

Your obedient servant,

A. B. DAVIDSON.

MAINTENANCE EXPENDITURE.

Institution for Deaf and Dumb, Belleville.

Statement of cost per pupil for 1895-6 and 1896-7.

Service.	Total expenditure for 1896.	Weekly cost per pupil for 1896.	Yearly cost per pupil for 1896.	Total expenditure for year ended Sept. 30th, 1897.	Weekly cost per pupil for 1897.	Yearly cost per pupil for 1897.
	$ c.	$ c. m.	c m.	$ c.	c. m.	$ c. m.
Medicine and medical comforts	370 49	2 6	1 36 1	304 99	2 2	1 14 5
Butchers' meat, fish and poultry, etc	3,747 36	26 4	13 77 6	3,297 19	23 3	12 39 5
Flour, bread and biscuits	1,505 76	10 6	5 53 5	1,785 89	12 9	6 71 3
Butter	2,706 03	19 1	9 94 8	2,357 92	17 0	8 82 6
Groceries	1,623 58	11 4	5 96 9	2,035 14	14 7	7 65 1
Fruit and vegetables	886 06	6 2	3 25 7	744 95	5 3	2 79 9
Bedding, clothing and shoes	495 18	3 5	1 82 0	770 80	5 5	2 89 7
Fuel	3,686 55	26 0	13 55 3	4,169 42	30 1	15 67 4
Gas, oil, etc	1,199 18	8 4	4 40 8	1,156 28	8 3	4 34 6
Laundry, soap and cleaning	552 04	3 9	2 02 9	493 33	3 5	1 85 4
Furniture and furnishings	1,233 89	8 7	4 53 6	771 62	5 6	2 90 0
Farm and garden—feed and fodder	1,276 86	9 0	4 69 4	1,081 54	7 8	4 06 6
Repairs and alterations	1,420 44	10 0	5 22 2	950 89	6 9	3 61 2
Printing, postage, stationery, etc	542 24	3 8	1 99 3	910 66	6 6	3 42 3
Books and educational appliances	659 48	4 6	2 42 4	524 27	3 8	1 97 1
Miscellaneous—water supply, etc	2,562 25	18 1	9 42 0	2,053 93	14 8	7 72 1
Salaries and wages	21,554 83	1 52 3	79 24 5	21,873 29	1 58 1	82 23 2
Total	41,022 22	3 24 6	169 19 0	45,282 70	3 26 9	170 22 6

Average attendance 1895-6, 272. Average attendance 1896-7, 266

FIFTH REPORT

OF WORK UNDER THE

CHILDREN'S PROTECTION ACT

ONTARIO

FOR THE YEAR ENDING NOVEMBER 30,

1897.

ALSO

SPECIAL REPORT

ON THE

IMMIGRATION OF BRITISH CHILDREN

PREPARED BY

J. J. KELSO

SUPERINTENDENT OF NEGLECTED AND DEPENDENT CHILDREN OF ONTARIO.

OFFICE OF THE SUPERINTENDENT OF NEGLECTED
AND DEPENDENT CHILDREN OF ONTARIO.

PARLIAMENT BUILDINGS,

Toronto, December 15th, 1897.

SIR,—I have the honor to transmit herewith, to be presented to His Honor the Lieutenant-Governor, the fifth Report of the work of this office under the Children's Protection Act of Ontario, being for the year ending on November 30th, 1897.

Also a special Report on the work of the British agencies that are engaged in placing children in foster homes and situations in this Province.

I have the honor to be, sir,
Your obedient servant,

J. J. Kelso

Superintendent.

The HONORABLE E. J. DAVIS,
Provincial Secretary of Ontario,
Toronto.

TORONTO, December 17th, 1897.

IN presenting a report of the fifth year's operations under the Children's Protection Act of Ontario, it is a pleasure to be able to state that this movement on behalf of neglected and dependent children continues to meet with the approval and support of the people of the Province. There has been an advance in almost ever branch of effort, and the practical work provided for by this law, as well as the principles involved, are becoming better known and understood.

The year has been a particularly busy one in this office, for, in addition to the superintendence of thirty Children's Aid Societies; exercising supervision over six hundred children in foster homes; supervising Industrial School matters; conducting correspondence of all kinds with societies, magistrates, judges and foster homes; receiving back and replacing children; preparing forms and general literature; visiting various sections of the Province, addressing meetings, etc., the administration of the Act regulating the importation and supervision of British children, has been added. This Act practically creates a new department, with many and onerous duties, and while I have striven to discharge worthily the added responsibility, some additional assistance will probably be essential in the future if the work is to be closely followed up. Owing to the lack of knowledge that prevailed on this subject, it was necessary to prepare a special and detailed report of the work of the various juvenile immigration agencies. This has required a great deal of careful investigation, but I trust that the results will be found to justify this labor. The Report is submitted herewith as an appendix.

The Children's Aid Societies of the Province continue to do a very important work for children, and the preventive measures carried on by these organizations in all sections of the Province must mean a very great improvement in the home life of neglected children, while, as this Report will show, hundreds of infants and boys and girls have been transferred from a condition of homelessness to assured and permanent places in respectable, Christian families. No new societies have been formed during the year, as the leading towns and cities were

already organized. There is room, it is true, for a much larger work than has thus far been accomplished, and I have every confidence that an increased knowledge of this subject will lead to greater things being attempted in the future, in the way of continuous and systematic effort on the part of the societies.

Attention is drawn in this Report to the great economy of the work. No large sums have been invested in buildings, and yet a splendid work has gone steadily forward because of the interest and zeal of many leading citizens of the Province and the consensus of opinion that all should unite in making brighter and happier the lives of unfortunate children.

One of the chief drawbacks experienced in the past has been the difficulty of getting municipalities to assist financially the societies organized under the Act. If leading citizens are willing to devote time and thought to the successful development of this work, it is surely the least that municipal councils can do to provide for the maintenance of children until they can be otherwise arranged for.

During the year I have received valuable assistance from Mrs. Harvie, who, in addition to visiting children in foster homes, has made many special investigations, provided clothing for destitute children, addressed meetings, and given wise counsel and encouragement to the many children passing under the care of this department.

As there may be some who have not read the reports issued from this office in past years, and who are not consequently fully posted regarding the principal features of the Children's Act, I would republish here some extracts from an article written by the Honorable J. M. Gibson, who, it will be remembered, introduced and carried the Act through the Legislature in May, 1893. Mr. Gibson is no longer the responsible head of this work, owing to his many other duties, but as a member of the Government he continues to take a deep interest in the progress of the movement:

"The provisions of the Act affecting neglected and dependent children contemplate the gradual introduction in Ontario of a new system of taking care of the unprovided for orphans and waifs of the community. Instead of the crowded children's homes that are found in our cities and towns, the placing-out or foster-home system is provided for by the Act. This plan of caring for neglected and dependent children has for some years been in operation in the Australian colonies, and has been remarkably successful. The South Australia Act of 1872, authorizing the placing out of dependent children is referred to by high authority as marking a new epoch in the treatment of children under government control throughout the Australian Continent.

"The Act contemplates that there shall be organized and incorporated Children's Aid Societies in the various cities, towns and larger villages; that these societies shall have for their object the putting into operation of the machinery and the enforcement of the provisions of the Act; and that an officer of any of these societies (who might well enough at the same time be a truant officer under the School laws) may be appointed and authorized to act as a constable. Such an officer would always be on the alert to detect cases of cruelty

to children, as already mentioned, but would also be instrusted with a most important duty and authority as regards neglected children. The Act authorizes such officer of a Children's Aid Society to apprehend, without warrant, and bring before the magistrate any neglected child under fourteen years of age.

"The parents or custodian of the child are entitled to notice of the examination by the magistrate, and if the magistrate finds the child to be dependent or neglected within the meaning of the Act, or in a state of habitual vagrancy or mendicity, or ill-treated so as to be in peril of life, health or morality, by continued personal injury, or by grave misconduct, or habitual intemperance of the parents or guardian, he may order the delivery of the child to the Children's Aid Society, and the Society may send the child to their temporary home to be kept until placed in an approved foster-home. The Aid Society then becomes the legal guardian of the child, and may place children in families under written contracts during minority, or for a shorter period, at discretion. Towards the expenses of caring for children in temporary homes or in foster-homes where they are not taken without compensation, the municipalities to which they belong are required to pay at least one dollar weekly for each child.

"The system contemplates the gradual absorption by the community of the neglected and dependent children of the State. The process of absorption is more natural and more gradual, and consequently more successful, than can result from the institution plan of caring for these children. As far as possible children to be dealt with should be restored to those conditions under which all should be brought up. They should have the care of motherly and fatherly people, who, as their foster-parents may replace those they have lost, and under whose charge they may participate in the wholesome family influences, which afford the best training for a good and independent life. The matron of a home cannot bestow her personal affection upon the large numbers under her control, and she should not single out a limited few to the exclusion of the others. The child's natural desire is for home life, for affection, and above all, parental love.

"The tendency of the times is undoubtedly towards the adoption of this system and the discontinuance of the institution plan of bringing up children collected together in large numbers. In those countries where boarding out has been fairly tested, there has been a marked diminution of pauperism and crime. Moreover, under no other method of dealing with State children is the direct cost to the public so slight, not to say anything of the great saving effected by the certain diminution of crime.

"There is no surer and more effective mode of improving society than the rescuing of neglected and dependent children from dangerous environments, wisely caring and providing for them during their early years, and giving them a good chance for a fair start in life. This is a busy world and philanthropic work is too much confined to the few, but a movement of so vital importance to society should enlist the active corporation and practical sympathies of all."

Great Economy of the Work.

The economy of this work is beyond question. Every child dealt with has been a direct saving of hundreds of dollars of public funds, amounting in the aggregate to many thousands of dollars yearly. In an orphanage the cost per year of maintaining each child is about $75, in an industrial school about $140, and in a reformatory about $200. Since the beginning of this work over 600 children

have been provided with homes, and the cost per child would not average more than about $30. If even half that number were maintained in public institutions for one year the cost would be at least $25,000, and if maintained three years would run up to $75.000, at a low estimate. It is true that all the children placed in foster homes were not absolutely public charges, but the great majority of them either were or would in the course of time have become such. In addition, hundreds of children have been saved from drifting into vagrant, criminal habits, and police and prison officials have been materially relieved of what is always a difficult and painful duty, that of looking after unfortunate and delinquent children falling into their hands. It should be borne in mind also, that in the inauguration and development of this work not one dollar has been expended on capital account. I doubt if any other country in the world can produce a better showing than this, or indeed as good. In almost all the States where similar child-saving methods are pursued, from $100,000 to $250,000 have been expended in buildings alone, as for instance in Michigan, Minnesota and Wisconsin, and the annual cost of the work is about ten times greater than in Ontario. Take for instance the provincial office, which is entirely maintained by government funds: the average yearly expenditure for the past four years has been less than $4,000, although through it alone, as a minor branch of the work, homes have been found for over two hundred children. This close and rigid economy has been exercised in order that the value of this branch of the public service as a money-saving agency might be fully demonstrated. In the future a larger grant will be necessary, for otherwise the strain on the machinery would be too great, but I have every confidence in saying that no department is more worthy of generous treatment than this, or will pay higher interest on the amount invested.

CHILDREN PROVIDED WITH FOSTER HOMES.

The placing of dependent children in foster homes continues to be one of the most interesting and successful branches of the work. The impetus given to the home-finding movement by the Children's Act, has undoubtedly resulted in a great work for unfortunate children, and it would probably be safe to say that over one thousand boys and girls have directly benefitted by the information diffused and the many friends that have been gained by the wide publicity given to the simplicity of this method of child-saving. Almost everywhere I go throughout the province I hear of homeless children that have been taken into good families, even where no organization existed, simply through the exertions of one or two who had learned of what was being done in other places. Such cases are not formally reported, so that they do not appear in any tabulated results, but the good is accomplished nevertheless.

The number of children recorded as having been placed in foster homes during the year, under the Children's Protection Act, is 215, making a total of 603 children now on the records. In considering the work done in this branch, from fifty to seventy-five should be added to the number placed in homes, as some were too old to go on the records, while in other cases the information supplied was too meagre. In addition also new homes were found for such children as were returned, or who were removed for any cause.

How Records are Kept.

It it very important that societies placing out children in foster homes should immediately send full particulars to this office on the forms provided for the purpose, so that entries can be made and subsequent supervision arranged for. If this is postponed the danger is that the matter will be overlooked, particulars of history will be forgotten, and meagre, if any, details will be available. If not recorded, the child, after a year or two may be forgotten and never visited to ascertain if the treatment, etc., is all that could be desired. When the printed return is received from the Society two large pages in the Record Book are devoted to each child, the name is entered on the top together with a brief sketch of the past history. Then follow entries from time to time as the child is heard from and all changes of the home or address, sickness or special circumstances, are noted down. A letter file for each child is also opened, and all letters received concerning any particular child are found together for reference at any time. Where possible, photographs of the children are secured before they leave for their homes, and there are at present in this office the pictures of 402 children. As the children advance in years other pictures are received, so that the collection is rapidly becoming a most valuable and important one.

Table Showing Growth of Home Finding.

The following figures show the number of children recorded as having been provided with foster homes, but does not include new homes for the same children who required to be changed:

Children provided with homes in	1894	79
" "	1895	115
" "	1896	194
" "	1897	215
		603

Sex of Children.

Of the total number of 603 recorded the proportion of sex was as follows:

Boys	379
Girls	324
	603

Societies Placing Children.

Returns of children placed in foster homes were made by the following societies. Only those children who were recorded for purposes of future supervision are given here:

Rev. C. W. Watch	48	Peterboro	5
Toronto Society	47	Dunnville	4
London	23	Galt	4
Hamilton	17	Barrie	3
Owen Sound	13	Brantford	3
Ottawa	6	Guelph	2
St. V. de Paul	5	Orillia	2
			182

Ages.

The ages of the children sent to homes during the year were:

Three years and under	43
Between three and six years	42
Over six years and under ten	54
Over ten years and under twelve	22
Over twelve years	20
	182

Location.

The counties or districts in which these children were placed are as follows:

Wellington	15	Huron	2
York	14	Norfolk	2
Grey	12	Peel	2
Manitoba	11	Brant	2
Muskoka	10	Kent	2
Middlesex	9	Welland	2
Quebec	7	Halton	2
Simcoe	9	Scotland	2
Parry Sound District	7	Carlton	2
Assa	7	Northumberland	4
Haldimand	6	Haldimand	2
Peterboro	5	Ontario	1
Waterloo	5	Grenville	1
Wentworth	6	Dufferin	1
Bruce	4	Nipissing	1
Lincoln	3	Oxford	1
Lambton	3	Alberta	1
Essex	3	Elgin	1
Hastings	3	Algoma	2
Victoria	3	Perth	1
New Brunswick	2	Renfrew	1
Stormont	2		182

Sex.

Of the 182 children placed out during the past year 84 were boys and 98 girls.

Replacements.

There were 34 changes of home among the children placed out during the year. Eight returned to relatives (two without permission); three ran away

and could not be found; and three died. Taking the whole number placed in homes by Societies during the past four years, there would be about fifty changes during the year, nearly all of them for natural and reasonable causes, difficult to classify.

Provincial Office.

Homes were found through this office for about sixty children, during the year, and other children were assisted indirectly—that is, through the co-operation of local auxiliaries. Returned children, not only from Societies but from public institutions, were assisted to situations, and some of these children were from sixteen to eighteen years of age, occasioning, on this account, a good deal of perplexity and anxiety. It is a matter for great rejoicing, however, that, with the exception of two runaway boys, none of the wards of this department have been guilty of any serious offence during the year. Some have been wayward and disobedient at times, but not to a greater extent than is common in any class of children, and foster parents have been most patient in their dealings with them. In speaking of children sent to foster homes I have in all my reports referred statistically to only those children whose names are actually on the record books. The number entered as going to foster homes for the first time from this office during the year ending with November is fifteen boys and eighteen girls, a total of thirty-three. Of these, eighteen were under six years of age, and eleven under twelve years. Owing to largely increased duties and frequent absence from the city it has been impossible for me to develop this very interesting branch of the work, but auxiliary organizations have been encouraged to avail themselves of the many good homes that are being offered for homeless children.

SUPERVISION.

The value and importance of supervision of children after they go to foster homes, although fully dealt with in previous reports, cannot be too frequently emphasized. The lack of this supervision on the part of some child saving agencies has brought reproach on the whole work of child placing, and experience is constantly proving that to throw off responsibility for a child when it goes to a foster home is simply courting disaster. Nearly all the cases of child-abuse in adoptive homes that have come to my attention have been largely due to the absence of personal visitation. The child is received through correspondence, no one ever visits or comes to see it, and the people naturally get the impression that the youngster is of no account, that anything in the shape of clothing will do, and that schooling is of no particular consequence. If a cheery visitor dropped in once and a while, if letters of enquiry and birthday and Christmas

cards arrived in due season, the treatment would be entirely different and cause for complaint would be removed. Some orphanages have entirely stopped sending children to foster homes, on the general plea that they would be "used as drudges." Their experience of placing-out was unsatisfactory and naturally so, because they neglected the great essential of sending a visitor to see how the child and the home suited each other. Three years ago, a girl of sixteen ran away from a home where she had been indentured until eighteen by one of the institutions. There was some talk of prosecuting her for breaking her indentureship, and when asked for advice in the matter, I undertook to visit her and adjust the difficulty. Her first statement was a strong arraignment of the institution that had placed her out. "I have been up here for four years," she said, "and no one ever came to see whether I was happy or not." She did most of the work, got very poor clothing and no wages, and her decision to take the law in her own hands and leave the place was encouraged by the neighbors, most of whom secretly sympathized with and aided her. Had a visitor gone in at any time during those four years the strained relationship would have been noticed in five minutes. This is the kind of placing out that is condemned by all classes, rich and poor, and rightly so, but unfortunately it continues more or less at the present time, and brings a certain amount of odium on those who conscientiously look after the children whom they profess to befriend.

The business of a visitor is not that of a detective, but of a friend. Almost invariably the person who calls to see a boy or girl is received most hospitably by the foster parents, invited to dinner or tea, and if circumstances suggest it, asked cordially to stay all night, even when there is no spare room and the family has to be crowded together for the occasion. The people are glad to know that some one is interested in their ward and willing to spend half an hour in a good old fashioned chat about his or her smart sayings or doings—and, it may be, about the failings and short comings that perplex and worry them occasionally. Even when a little careful observation reveals the fact that the clothing, schooling, etc., are not being attended too, a candid outspoken utterance will be received in good part. In fact a visit of this kind properly made should result in untold good to the child by awakening the foster parents to a higher sense of their responsibility and their privilege.

Where the distance is not too great, the society should endeavor to have some one visit and report upon the home in which it is proposed to place a child, but if this is impossible there should at least be sufficient correspondence to afford satisfactory proof that the applicants are respectable church-going people, well spoken of by their neighbors. It is also important to ascertain that there is no grinding poverty in the home, for sometimes people will apply for a child who are not able to pay their rent, and are not quite sure where their food will come from next week. Then when the child has once become a member of the family in addition

to reporting the fact to this office, the earliest opportunity should be taken to have the home visited so that the knowledge of the child's well doing may be clear and emphatic. Three children placed out recently by one of the younger societies had to be removed by direction of this office, owing to the poor class of home to which they were allowed to go. If the impression once got abroad that "any kind of a home is good enough for a homeless child," the tone of the whole movement would be lowered. Our aim and ideal must ever be the "best" homes for these children, who in their helplessness and homelessness are in a peculiar sense a charge upon the hearts of Christian people.

In calling upon a child in a foster home it is usually better that the child should not be present during the conversation with the foster parent. Questions and explanations are almost sure to come up that it would be better for the child not to hear. Afterwards, when these have been cleared away and the talk becomes more general, the boy or girl might be brought in to make acquaintance with the visitor, and to receive commendation on such points as deserve approval and endorsation. Another essential is that the visitor should see the child alone, so that there may be full opportunity for the unburdening of any complaints, and a little judicious enquiry as to clothing, school attendance, work and companions. Any foster parent should recognize the reasonableness of such a request, and there should be no timidity in asking for it. A lack of thoroughness in the visiting may completely mullify any possible good results. A case came to my notice recently where a girl remained for several years under very improper conditions, and yet she had been visited in a sort of way four times.

A very important feature in elevating the self respect of the child is the way in which it is clothed, and this matter must be looked into by the visitor. It is essential that the child shall be clothed up to the standard that prevails in the neighbourhood, in order that social inferiority or the brand of charity may not be suggested. In fact the quantity and condition of the clothing is one of the clearest evidences of the child's position in the household. If a girl has a couple of best frocks, a warm jacket, good boots and stockings and suitable changes of underclothing, the indications are good, but if these things are lacking then there is room for grave remonstrance. Only in two or three instances has serious fault been found with the clothing or lack of clothing of children placed out under the Ontario children's protection act, but in the case of children brought out from the old country this is one of the chief reasons for urging a close and continuous inspection. Among the cases of English children I have had investigated, one girl of sixteen had no proper change of underclothing and no nightdress for several years; another girl of twelve had not worn drawers for over a year, and a third girl of fourteen when her outer dress was removed was found to be literally clothed in rags, although there were three women in the house who could have, in a couple of days, made her all she needed. Two of these children

were placed out from Miss Rye's home where no system of inspection existed, and neither of them had ever been visited by anyone since their arrival in the country. The remedy for these abuses is quite simple—namely, the maintenance of a proper interest in these children until they are fully old enough to be entrusted with the management of their own affairs. The object of child saving is not to lift children out of one kind of evil environment and place them in another, different in some respects but just as questionable when the ultimate welfare of the child is considered. Child saving and home finding is making rapid strides in public favor, and this should mean an added responsibility to all who attempt the work. Faithfully and efficiently conducted it is a glorious privilege to lead the loving, trusting little heart to a safe refuge in a good home, and such service will surely be acceptable to Him who has so often proclaimed Himself to be the "Father of the Fatherless," if done "as ever in His sight," and with all the care and discretion that such work imperatively demands.

But the placing of children in foster homes cannot be carried on unless Christian people come forward and offer to receive the children. Although a generous response has been made in the past there are still many who would find a joy they have long been seeking in caring for one of these little boys or girls. The charge is often made that children are taken for the amount of work they can do, and while we have no desire that children should be brought up in idleness, still, this as the sole motive would class the application as undesirable. There is a higher and a nobler motive in asking for a homeless child—a motive inspired by divine compassion, and an earnest wish to develop the hidden possibilities that are to be found in every child's nature. Such a motive must inevitably mean great blessing to the child, but it also carries with it a rich reward for those who take up this mission of love. Hundreds of homes have been made supremely happy by the presence of these children, and withering hearts have been gladdened and refreshed by the laughter and chatter of these little ones. A boy of eight who had recently entered one of these homes, paused, as he came up from the cellar with a scuttle of coal, and remarked to his foster mother: "Mammy, you ought to be real glad that the Lord sent me to you," and so she was, and so will all who give one of these little fellows a chance to run little errands for them.

The visitation of the children in their foster homes has been prosecuted steadily and systematically during the year. Practically it may now be said that all the foster children of the department are under direct supervision. The provincial agent has made in the neighborhood of 250 visits since January, 1897. To reach these homes, many of which are in very isolated places, a large amount of driving, probably nearly 2,000 miles in all, has been necessary outside of railway travel. Of the remaining 350 children now in homes over 150 have been visited by members of the visiting committees, the Provincial Superintendent, agents and officers of Children's Aid Societies, members of the W. C. T.

Unions, Missionary Societies, etc., and other friends of the work. Inspection is not needed in the case of over 100 as they have been adopted by relatives, or the circumstances are exceptional. Of the remaining 100 a number have been placed within the past three months, and these foster homes will be included in the routes next year. Others are located in the North West, the majority of whom have been heard from by letter.

Description of one of the Visiting Trips.

A few notes of one trip from Mrs. Harvie's diary may prove interesting to friends who are specially concerned in the close supervision of the children. Care is taken not to reveal the identity of the homes in the various localities.

June 16th. Left for an extended trip this morning and proceeded to the town of A—, there took steamer and crossed one of the pretty inland lakes with which Ontario abounds. Stopping at the point where one of our foster homes was located, as indicated by the address in the office books, discovered that the family had moved some time ago to the vicinity of a summer resort several miles down the lake, went ashore and waited for the down boat. Found upon inquiry that the family to be visited resided on a farm across the lake and could only be reached by small boat. A stiff breeze was blowing which, with the lateness of the hour, rendered an attempt to reach the foster home of little Johnnie before morning impossible. Repairing to the only hotel in the place, it was found so crowded with visitors that it was impossible to get even a sofa or a camp bed. Turning away in despair, I encountered a gentleman, an acquaintance belonging to Toronto, who with his family was residing in a cottage near by. He was regarding my evident distress with a merry face, and hastened to relieve my anxiety by saying, "Do not for a moment suppose that this hotel, commodious as it is, represents all the capabilities in the way of hospitality of L—. Come over to our home and prove what a delightful thing life in a summer cottage in this lovely island really is. It is needless to say that I went, and enjoyed everything. In the morning it was raining, a regular downpour, but after a while it cleared, the sun shown through the clouds and it was not long before our rowboat touched the little wooden pier on the other side of the lakelet. The visit was a pleasant one. The family, though not well off, was thrifty and industrious and very much attached to Johnnie, who was well, nicely clothed and very contented. He was going to school and went with his foster parents to church in the boat, whenever the weather was suitable. Returning to L— took steamer for D— which was reached about 1 p.m. in the midst of another downpour of rain. It seemed to rain most of the time among these lakes and rocks. Engaged a covered livery rig with a good driver and started at 2 o'clock for a hamlet twelve miles distant. The rain continued, and truly this road is quite beyond description. Through mud holes, swamps and gullies, over rocks and stones, hills and corduroy for twelve long miles we went. The best we could do, even with a good horse, was between three and four miles an hour, consequently it was after 5 o'clock when we drew rein at our stopping place. It was the home of a Presbyterian elder, who with his wife, a pleasant-faced motherly woman, had adopted a sweet little girl of three years. If ever child was happily placed this one is, and we were well repaid for a tiresome journey in listening to her innocent prattle, hearing about all her little winsome ways, and in inspecting the pretty dainty dresses and the "new tan shoes." Tea was hastily prepared and within the hour, a start was made for the return journey which was accomplished, mud holes and all, before 9 o'clock.

17th. Took a conveyance, starting at 8 o'clock a.m., and drove about thirty-two miles to visit three children. The first home was that of Mr. A—, sixteen miles back from the railway station of G—, in a new and rough part of the country. Stopped when within two miles of Mr. A—s' farm by a broken bridge, which a number of men were repairing. After reconnoitering, the driver said it was impossible to go on, and that of course there was nothing else to do but to turn back. Asked him to remain with the horse and rig, and decided to get down into the ravine, ford the small stream with the aid of sticks and stones, get up the other side and walk the distance to the farm house. After considerable scrambling this was successfully accomplished and we reached our destination safely. The foster father, his own son, a boy of fourteen, and his foster daughter M—, a girl of twelve, were all in the field harvesting hay. Mrs. A— took down the dinner horn and summoned the family with two or three prolonged blasts. We had an interesting chat, and favorable impressions of the home and family were made upon my mind. Their foster child was exceedingly troublesome, and from statements made by all the members of the household, it was impossible but to conclude that the girl was careless, shiftless and

disobedient. Every privilege had been allowed her in the way of attendance at day school, Sunday school and church, and she, with their own little boy, had been taken when the parents visited friends in the neighboring villages. A kind but firm reprimand was given, and M— was plainly told that unless there was marked improvement she could not expect to stay in this home.

The next call was at a pleasant farm house many miles distant, near the town of B— where twin children, a boy and girl of six, had been adopted a few weeks before. These little ones had been lifted out of very bad surroundings, and it was a great satisfaction to find them so happy and so tenderly cared for. At the time of my call they were having a little doll's party, to which the foster mother had been invited, but they came in cheerfully to speak to the strange lady who had driven so far to see them, said the Bible texts they had been learning at Sunday school, and looked and acted altogether very prettily. The boy has a thoughtful face and manner, and a broad and expansive brow, and one might without hesitation predict for him, with the training now received, a career of importance and usefulness. Took the train at B— for F—, arriving about dusk. The home of Mr. R—, where we hoped to stay all night, was two miles distant. Succeeded, after some difficulty, in getting a conveyance, reaching there about nine o'clock. Rapped at the door, and while explaining to the foster parents of little A— who their visitor was, and why she had come, a young lady, sitting in the room and hearing the voice, sprang to her feet, hastened to the door, saying, "Oh! that is Mrs. Harvie, I know her voice, I heard her giving an address in O—, my old home." This made us all feel acquainted at once, and we spent a very delightful evening. During the course of it, the mother took a lamp, and we made a visit to the cot of the sleeping child, their adopted girl, aged about ten years. M— is a clever child, but wilful and pert, with an old bad habit clinging to her still, but the foster parents are patient, the home influences are excellent, and it is hoped that as the child grows older and wiser she will improve. Had an earnest talk with her in the morning, and promised that Santa Claus would assuredly visit her at the Christmas tide if she was a better girl.

18th. Drove out about eight miles to a home in comfortable circumstances, situated on the shore of a beautiful little lakelet. Mr. and Mrs. G—, a comparatively young couple, had some months previously adopted a specially sweet little baby girl. It was really refreshing to see the love manifested towards this child. In one room a baby swing was fastened to the wall, in another a baby jumper, and when we arrived the little creature was lying laughing and playing in the bottom of the clothes basket, near the barn, while her father attended to the "chores." At dinner this devoted father took nothing himself until he had fed his baby girl. The Christian tone in this household is marked, and the training will be good. Returning, went again to the home of Mr. R—, hoping to get a team to take me on to S—, where the foster parents of little Willie resided. Mr. R— was away on business, and as the distance was only three miles, decided to walk it. This was perhaps the most eventful afternoon of the trip, at any rate the incidents seemed exciting at the time. While walking along leisurely through a wet swampy place, almost out from under my skirts crawled a huge striped snake, fully two and an half feet long, the largest of the kind I had ever seen. There was the usual woman's scream, a rapid turn and a quick run, but in a moment or two on looking back the snake was gone. Soon after, I entered a very dense and disagreeable swamp. Afterwards I learned that it was called "The Wolf Swamp." The road for horses and teams was almost impassable, for pedestrains apparently, entirely so. Soon after entering I halted on the end of a log to take my bearings, and finally concluded to go on, armed with a few bits of broken wood for stepping places, through the mire. In ten minutes the worst was over, and emerging into a fertile belt of land sparsely settled, shortly reached the home of Mr. and Mrs. E—, who are very comfortably situated on a large farm of their own. The home is an excellent one and Willie would not leave it for anything. He, though only a boy of seven, has his possessions,—a cow and a pony, and some of the farm, he says, is going to be his. I enquired how they had heard of the work and were led to send for this bright boy, and ascertained that in a piece of an old torn newspaper wrapped around a parcel of soap there had been found a description of Mr. Watch's work for children at Brighton, and their own children being all grown up they had decided to send for Willie. This child could not have a better or more helpful home, in which to grow up. Stayed all night, and in the morning the daughter of the household drove me to the station.

19th, Went up by train to the town of H—, and drove seven miles to T—, to see Eddie, a boy of seven, adopted by Mr. Y—. As it was Saturday evening, inquired if they could put me up till Monday and then take me to the station. Being made heartily welcome, I settled down, for a visit in this thrifty, well-appointed farm house. The farm was in fine order, the outbuildings good, and everything gave evidence of plenty and comfort. The boy was a happy little fellow, well dressed, well cared for, loved, petted and caressed, and in many respects his prospects for the future are bright. The school is some distance away, and religious services are seldom held in the neighborhood. To make up for this the foster-mother is a woman of considerable education and intelligence, and the boy is very much with her. When I arrived, the

baking for Sunday was in progress, and Eddie was helping by running to the well every few minutes, for a pail (a tiny affair it was) of water for mother. Up and down the small feet pattered, the small boy happy in the thought of helpfulness.

Sitting through the hours of the Sabbath, with no church and no Sabbath school, made me thankful for the privileges of a city like Toronto. Learned that this family had heard of the Toronto Society, whence the boy came, through an account of the work in a denominational newspaper.

21st. Started in good time on Monday morning to catch the train at H—, when after a short run we halted at K— to visit a young girl of twelve years of age, who had been adopted by a married sister from a very indifferent home. Found that the child had left the sister a few days previous, presumably at the instigation of the father, and her present whereabouts were unknown, as her former home was broken up at the time the child was given to the sister. Placed the matter in the hands of the Children's Aid Society in the vicinity, whose officers were already aware of the circumstances, and were in quest of the child.

Continued my journey in the afternoon, stopping off at the quaint little village of C—, where one of our most beautiful little girls had been adopted. This is a home not only of comfort but of luxury, and here this little maiden, then about three, will enjoy the highest advantages for culture, and be surrounded by the best of influences. A couple of hours were happily spent here, and after tea drove into the large town of B—.

22nd. Visited an influential family here who a few months before had taken a baby girl of one and a half years of age. No other children had ever been in this home, and the babe was bringing to the hearts of the foster parents so much blessing, so much happiness,—indeed, the joy of the household over the little one was indescribable. Marjorie had never been baptized, and quite a gathering was to assemble that same evening, when the child was to be dedicated to the Lord in this Sacrament. After this satisfactory visit, engaged a conveyance to take me out a few miles to the farm home of Mr. P— to see Harry, a lad of thirteen years. When we entered, the foster mother, who had been an invalid for some time, was sitting by the table in a rocking chair, and standing by the same table ironing, was Harry. As I watched him for an instant, I felt proud of this lad, who, prompted by true affection for his adoptive mother, could willingly for her sake take up the burden of house work in this way. Conversing with the lad alone, learned from him, and he spoke with much feeling, that his foster mother was kinder and more thoughtful to him than even his own dead mother had been, and the family had been scattered, only because she had thus gone. Talked over the boy's prospects with the foster mother, and received a promise that he should be sent to school during the winter.

23rd. Left B— for the village of S—. Getting off at the station, ascertained that the family to be called upon resided over three miles distant. There was neither hotel nor livery stable in this village, and not a horse could be obtained without walking a mile or more in an opposite direction. Concluded to walk the three miles, and after getting the necessary directions set out bravely. Before going half the journey a thunder-storm threatened, and as I entered the farmhouse yard the first drops were falling. What was my dismay to learn from a lad who was doing some work at the barn that the foster parents, Mr. and Mrs. F—, had driven that morning to O—, taking the little girl with them and that they would not return before nine o'clock; the house being locked up in the meantime. After considering a moment I determined to seek shelter at the house of a neighbor opposite. Received a warm welcome and stayed all night, as it continued to rain for hours. Was up betimes in the morning, and had breakfast at the foster home across the way at 6:30 o'clock. This I found was an excellent home, the only difficulty being that the child, a little girl of three years, was in danger of having too much of her own way. Spoke to them kindly but very earnestly about the necessity of discipline, and received a promise that at least Lucy should be punished for disobedience.

24th. Got out to S— in time for the nine o'clock train, and went to the town of O—, where a number of children are placed. Visited them all; a girl of twelve, an older one of fifteen years, a delicate one of eight, and a fine smart boy of ten. All were in desirable homes, happy and comfortable, improving in their studies and in usefulness in the house. At 12 o'clock noon started on a drive of twenty miles to visit four children, two girls and two boys, in four different homes. The first was a girl of fifteen who had been living more than three years with Mr. and Mrs. Y—, her foster parents. It was a superior home. M— had been treated with much loving consideration, and she could make no complaint, only that she was unsettled, did not like the country, wanted to go to Toronto, etc. Talked a long time with her, and secured her promise to remain at least another year and not to think of leaving without letting Mr. Kelso, the superintendent of the department, know. Called at the next home to see F—, a very interesting girl of ten years. She was busy sweeping the floor, and though small of her age is very smart. F— goes to school constantly, and improves rapidly, and has had several prizes in the Sabbath school. Drove on quickly to the other foster homes of the little boys. These were about three miles apart. Was not at all satisfied with the position of either. They were small

boys of seven and nine years, and seemed to have been taken for the work they could accomplish. Neither of them had been sent to school nor to Sabbath school since they had been placed, six months previous. Recommended their removal. During the visit I promised one of the boys to send him some papers. and as we drove out of the gate he called after us, "Please ma'm' don't forget the papers."

25th. Took the train for E—, where were two children, a boy of six and a girl of ten. Both were in the homes of farmers a little distance out of the village. At a visit made the year previous had found that the little girl could not read and was not being sent to school. Received a promise then that she should be sent all the coming season. On my way out to the home called at the school house, saw the master, examined the register, and found that J— had only been fourteen days to school in eight months. Mentioned this to Mrs. S— immediately on arrival, and after a long conversation felt that the circumstances of this family were such that sending the child to school with any degree of regularity seemed out of the question, and difficult as was the task, determined, according to instructions received from the superintendent of the department, to take her away with me. As we passed the school house on our way to the station we called and heard the little boy recite his lessons, having at a previous visit spent some time with his foster parents who are doing their duty very patiently and lovingly with this stirring, mischievous wee boy.

Returned to Toronto the following day, satisfied that good will result from these many visits.

This trip is but one of a dozen of the same nature made during the year. However, this is sufficient to make clear the kind of supervision exercised over the wards of this department and the Children's Aid Societies.

Deaths.

During the year four deaths occurred:—One of these, a little boy of three, had been handed over by one of the Infants' Homes to this office for adoption. He was taken by a worthy couple who soon became deeply attached to their little son. He was growing a strong, bright little fellow when suddenly he sickened, and after a short illness passed away. As the foster parents were not very well off, and the expenses of medical attendance and burial were heavy, an offer was made to assist them in this outlay, but with many expressions of gratitude and appreciation this was declined, the mother saying, "that A— was just like their own little boy, and they must do for him as for their own." This was a touching evidence of the strength of the affection which had developed for the friendless child taken into their hearts and their home. The foster-home system thus encourages the growth of all that is most beautiful in family life, both here and hereafter; for, as these bereaved parents stated, they would ever have sweet and tender recollections of the little child who awaits their coming in the "Happy Land." A few months later hearing that the brother of this child was without a home, these kind hearted people signified their desire to have him come to them and take the vacant place. This was successfully arranged and so far there is mutual happiness and satisfaction.

The second death was that of a girl ten years of age, who had been placed in the vicinity of Toronto. The foster home was a good one, bnt in the meantime the mother was continually urging the return of the child. At length it was deemed advisable to yield to these entreaties, and the little girl who was

very far from strong was returned to her mother. Both went to the city of Buffalo, and after a few months the child died of consumption. Fictitious stories of her ill-treatment in her Canadian foster home, were circulated by the mother, and lengthy articles appeared in the Buffalo newspapers to this effect, alleging also, that the little girl had been stolen from her mother and inhumanly treated, the result being her premature death. These statements were incorrect, and probably if the girl had been left in her foster home she would have been alive to-day, although the disease would ultimately have carried her off.

Another little girl, who had been delicate for a long time, passed away in one of the Toronto institutions. She had been placed in an excellent foster home some two years ago, and here also, as in the first mentioned case, the foster parents had been at extra expense for care and medical attention. A question of religion caused the transfer of the child to another home, much against the wish of the foster parents who, despite her weakness, loved the child very dearly. Eventually, presumably on account of ill-health, the little one was returned to Toronto, where she died after a lingering illness.

The last death was that of an apparently strong and healthy girl of fifteen. In her case, the uncertainty of life is strikingly demonstrated. The Provincial visitor, who was making a tour of the county in which she was placed, had four days previously, made a very pleasant and satisfactory visit in this home. The girl seemed perfectly happy and expressed her thankfulness for all that had been done for her. The cause of death was a severe cold, which turned into inflammation of the lungs and brought on heart failure. A physician was present when she died, and in order that no blame might attach to the foster parents, the coroner of the district issued a certificate, setting forth that death resulted entirely from unavoidable causes.

A Boy's Progress in the Northwest.

A striking example of what may be accomplished by a little timely assistance is afforded by the following letter. About two years ago, a young fellow, sixteen years of age, asked one of the Societies to get him a place in the country, as he was not getting along well at home, his father being addicted to drink. A situation was procured for him in the Northwest and this letter from a pioneer shows how he has been doing since that time:

"Dear Sir,—In answer to your letter of the 5th inst., I am pleased to tell you that T. H. is well and doing well. He has taken up a homestead alongside of mine with forty acres of land broken on it. He has also bought a yoke of oxen on the condition that he break forty-five acres. The man he bought the oxen from buys him a plough to do it with. This is a very good start for T. He is now working for a neighbor of mine, but is going to live with me for the winter and I will do all in my power to help him along. I hear that his mother has been very sick. Poor woman, she seems to have to work pretty hard. I think if she were out in this country she would get along better. I think T. wants to make a home for her here. This is about all the information I can give you at present concerning him."

Co-operation Desirable.

One of the greatest needs of the present time is a closer relationship between the various child-saving organizations of the Province. Co-operation is almost entirely lacking, not alone in work for children but also in all charitable effort, with the inevitable result that there is a large waste of energy and a failure to realize all the good that might be possible under different circumstances. Especially should there be harmony of action between the Children's Aid Societies, orphanages and industrial schools. There are many children in orphanages who have been deserted entirely by their parents, and they are allowed to drift along for six, eight or ten years until old enough to be apprenticed as servants. With the aid of a Children's Aid Society, such children could be placed in good foster homes without delay and in addition to the economy of the plan, they would merge into the general community in a natural and satisfactory manner. Then sometimes through lack of knowledge, the magistrates in towns and country districts commit very young children to institutions, even at the tender age of six or seven, when no offence has been committed and the only object is to remove them from undesirable home surroundings. In such cases, the Children's Aid Society offers the solution in providing foster-homes for the unfortunate little ones. If left in an institution to associate with older and often depraved children, the effect is, of course, injurious, while there is the absence of home ties and influences and the danger that the parents—although entirely unworthy, will continue to occupy their minds, so that severance later on will be almost impossible. There are occasions when the wards of the Children's Aid Societies might go to an industrial school for a short disciplinary training, but this aid is not resorted to much at present, owing to the difficulty of getting the child back from the school authorities within a reasonable time. Magistrates sometimes send children to industrial schools and reformatories because the local influences are against them, and there is no doubt but that in a good many instances all the desired results could be secured by the simple change of environment, and daily association with respectable and industrious people. It is a question whether it would not be wise to have all children under fourteen years of age committed primarily to the guardianship of this office and the subsequent mode of disposal decided upon, with a view to the child's best interests, and the securing of economy and efficiency, apart from any mere motives of sentiment. To advocate such a plan as this may on the surface indicate a desire to aggrandize the Provincial work, but the suggestion is only thrown out in the belief that such a change would mean a saving of many thousands of dollars and would also be infinitely better for the children, whose whole future destiny may be made or marred by the plans decided upon for their future happiness or success in life.

Children's Shelters.

One of the greatest difficulties encountered by the various societies in their efforts to provide for neglected children, has been the unwillingness of the municipalities to contribute even a small amount toward the temporary support of the children. Over and over again cases of neglect and ill-treatment that required imperative action, have been dropped, owing to the fear that the town or city might be liable for maintenance fees if the children were committed to the Society. Owing to this difficulty, I have frequently urged Societies to accept children without any guarantee of payment by the municipality liable, rather than allow the case to go by default. But it is manifestly unfair to expect a few private individuals, in addition to their personal exertions, to become liable for the expenses connected with the care of these children. The same unwillingness to incur expenses in connection with child-saving has been evident in the matter of a Children's Shelter. The more generous of the municipal councils have given small grants, but have not as a rule, complied with the requirements of the Act, which calls for a suitably equipped shelter in every city of 10,000 inhabitants. Toronto is the only city that has provided the desired accommodation, and its action in this respect is worthy of all praise. In some of the smaller places, such as Guelph, arrangements have been made with private parties for the care of a child in an emergency, and the city of Peterborough has recently aided the Society in securing a Shelter building. But, owing to the fact that no compulsion has been brought to bear on councils, they have not taken up this matter in anything like a generous spirit. The design of the Children's Shelter was that it should be a general municipal clearing-house for neglected and dependent children, and would also serve for the temporary detention of wayward children, who often are not as bad at heart as they appear. It is agreed by all who have given the subject the slightest consideration, that bringing young children into contact with police cells and lockups is disastrous to their future welfare. By means of Children's Shelters, the necessity for children being confined even for an hour in the police station would be avoided. There are also circumstances in which it is necessary to provide for children for a few days, until enquiries are made and parents induced to properly discharge their obligations. Where there is no shelter the society is sure to hesitate in accepting the responsibility for a number of children for whom they have no accommodation. Recently the secretary of one of the societies wrote that there was a party of children four or five in number urgently requiring attention, but no action was taken because there was no shelter. These cases are frequently arising, and in my opinion the time has come when a city having a population of over 10,000 should be compelled to provide the society with suitable premises in which to conduct the work. It seems to me that one of the first places requiring a shelter is the city of Hamilton, and there should

also be a shelter in Ottawa and possibly one in St. Thomas. In London arrangements have been made whereby the Orphan's Home answers to some extent the purposes of a shelter, but when boys require to be detained or disciplined for a few days there are no suitable facilities for so doing. Orphanages and children's institutions do no care to take in temporary cases, as the coming and going of children interferes with their regular work. Often a boy may be checked in a course of truancy or even theft, and prevented from further wrongdoing by a week or two of detention in a suitable shelter. The only alternative at present seems to be to let them go without such discipline or send them to an industrial school for a term of years. The latter course is objected to on account of the expense, and too often the consequence is that the boy is allowed to do as he pleases until he becomes hardened and indifferent. The fact is overlooked that premises in which a child could be detained for a week or two at a time would often accomplish as much at a comparatively trifling cost, as under other methods would involve large expenditure, without, it might be, securing any real change or improvement in character. The benefit of this work would be clearly manifest, I am satisfied, if only the Act were properly enforced in all its details, for as a piece of preventive legislation it is admitted to be equal if not superior, to that of any other country along similar lines.

Boys Familiarized with Criminal Procedure.

From long observation I am convinced that many boys receive much of their training in crime in the police cells and courts, when hastily arrested for some petty offence,—a curious commentary on modern methods of crime prevention. The fact is, that the very vigilance of our police officials is apt to work harm, and the lack of elasticity in the procedure is also detrimental to public interest. A group of boys are gathered into the lockup for some youthful prank, and the police system, the court and the gaol, are so different from their expectations that they go away feeling something like contempt for the whole business, and are not at all deterred from a repetition of the offence by anything they have seen or heard. I well remember watching a lad being dragged to the police station for stone-throwing whose cries and fears were heartrending at the thought of incarceration. Next morning the same lad was found frolicking around his cell, chatting freely with two other prisoners and laughing at himself that he should ever have dreaded such a pleasant institution. On another occasion I followed a boy who had been discharged after a night's imprisonment. He was met by an admiring crowd of six other lads who listened with great delight to the recital of his experience, envy of his distinction being clearly indicated on their countenances. A dozen such instances might be related, showing the disastrous results of first imprisonment. Not long ago the Toronto papers told of the hilarious amusement of half a dozen newsboys who were sentenced to six hours in the cells,

as a punishment. So far from being a punishment, it was a time of thorough enjoyment, for as they were together they indulged in all kind of games, and jeered and ridiculed the officers who tried to keep them quiet. Quite recently the Hamilton papers described a juveniles' day in the police court of that city, when twenty-five youngsters were put on trial for various offences. No wonder there are so many candidates for reformatories and prisons, when children are thus early familiarized with criminal life and introduced to the companionship of the depraved. If anyone will take the trouble to look up the records of noted criminals, they will find that they started their career at ten or twelve years of age, and were back and forward in courts and cells until they acquired a complete knowledge of the machinery for apprehension and punishment. The ordinary police court proceedings lack in dignity and impressiveness. Jokes and laughter are freely interspersed, and there are always lawyers found ready to defend those whom they know to be guilty, and to advance all sorts of specious arguments in their defence. Each case becomes a clever controversy between contending parties in which the question of guilt or innocence is lost sight of, and technical considerations seem to prevail. Often a prisoner, who feels that his guilt must be apparent to everyone, is amazed to find that, by dint of argument, his lawyer succeeds in procuring his discharge. This moral casuistry, which is so common in police courts, is very apt to render the prisoner callous and fearless, and in the case of boys it almost invariably does so. It was because of this hurtful tendency that both the Dominion and Ontario Governments passed laws especially designed to protect youthful offenders from further contamination. The Dominion law reads as follows:—

"550. The trials of young persons apparently under the age of sixteen years, shall take place without publicity and separately and apart from the trials of other accused persons, and at suitable times to be designated and appointed for that purpose."

2. Young persons apparently under the age of sixteen years who are:—

(*a*) Arrested upon any warrant; or

(*b*) Committed to custody at any stage of a preliminary enquiry into a charge for an indictable offence punishable on summary conviction; or

(*c*) Committed to custody at any stage of a trial, either for an indictable offence or for an offence punishable on summary conviction; or

(*d*) Committed to custody after such trial, but before imprisonment under sentence,—

Shall be kept in custody separate from older persons charged with criminal offences and separate from all persons undergoing sentences of imprisonment, and shall not be confined in the lock-ups or police stations with older persons charged with criminal offences or with ordinary criminals.—Canada Statutes, 1894, chapter 58.

(Other provisions permit of the committal of any child found guilty of an offence to the guardianship of a Children's Aid Society instead of being sent to prison.)

The provisions of these laws should be constantly brought to the attention of magistrates and court officials, and every effort made to secure the observance of the spirit as well as the letter of the law. The danger is so serious that too much precaution cannot be exercised in dealing with these lads,—and special

emphasis should be laid on this rule: to avoid in every way possible the arrest and confinement of youthful offenders. If an offence has been committed the parents should be seen and if necessary a summons should be issued, the parents being held responsible for its fulfilment, and before the police take definite action the assistance of a Children's Aid officer or some benevolent person should be invoked with a view to securing improvement in the lad's conduct. In the great majority of cases a whipping would be infinitely preferable to imprisonment, and as the law does not at present recognize this mode of punishment the aid of the parents must be called in. The children's law provides for a Children's Aid officer in every town to deal with erring children and save them from falling into the hands of the police. Unfortunafely very few such officers have been appointed owing to the municipalities failing to realize that one man acting as a preventive officer would save the salary of a dozen policemen.

A Note for Magistrates.

It is important to note that magistrates or judges can always secure assistance from this office in arriving at a decision as to the best course to pursue in dealing with any particular child brought before them. In a general way, however, the following broad principles of our laws for neglected or delinquent children might be given here: When it is necessary to entirely remove a child from the control of a degraded relative or guardian, the child may be legally handed over to a Children's Aid Society, or where there is no society, to this office, so that a foster home may be found. Where it is considered desirable to temporarily remove a child from its parents, then it could be handed over to a Children's Aid Society, and the cost of board assessed against the municipality for such a time as would allow the parents to give indication of reformation and consequent fitness to resume the guardianship; if a child has been guilty of serious and repeated misconduct it may be committed to an industrial school if between the ages of eight and fourteen. The Ontario Reformatory for Boys and the Ontario Refuge for Girls, are for older children guilty of wrongdoing, the mininium age for admission being thirteen. As alluded to more than once in this report, if there is a Children's Shelter a wayward child may be remanded to it for a week or so, and with the co-operation of philanthropists and parents this may be sufficient to secure the desired improvement. In Toronto a large number of children are dealt with in this way, to the lasting benefit of all concerned.

Increased Effort Needed.

An intelligent study of the great work being done in Ontario for English children ought to lead thinking people to see the necessity for doing more than has been done in the past for our own native born children. The statement is frequently made in an off hand way by speakers that while we have orphanages

and industrial schools of our own to maintain, we ought not to encourage the importation of children, but this is aside from the question, as I have not yet found the British children's work to interfere seriously with our own work. There is a large demand for Canadian foster children, and although the Children's Aid movement has been in existence for several years we have not yet been able to meet more than one-half the requests that have been made for boys and girls. Applicants have been turned away not only from this office but from every Children's Aid Society, who could have furnished most desirable homes if only children could be found for them. It is not that there are no children, but that they are not under the control of the Children's Aid system. They are in the orphanages, the boys' and girls' homes, industrial schools and reformatories, and being comfortably housed in these institutions and the officers feeling, perhaps, that their positions depended on the number of children they have in charge, makes the work of getting the children out almost an impossibility. Not long ago an officer of one of these public institutions remarked to me "we could give you thirty children for foster homes, but then what would become of our institution?" It would certainly be rejected as a most absurd proposition that the welfare of the building should be placed before the welfare of the children, for whom all the philanthropic effort is supposed to be expended, and yet I fear that in many instances the children are lost sight of, and the rules, regulations and plans for the aggrandizement of the institution placed far above the interests of the little boys and girls whose hearts crave for a real home, a real mother and a real, instead of an artificial, system of work and play. Charity, especially that branch of charity which deals with children, has come in these days to be a fashion, and people of wealth and leisure often identify themselves with the management of these institutions who would never dream of kissing one of these little faces or taking a deep personal interest in any one of these little lives. Outside of attending the monthly meetings and a critical inspection weekly, to see that the floors are clean and the clothing in good order, the actual work, that of caring for the little ones themselves, is left to the matron and her assistant. And how often it is that the matron and those who are living all day with the children become tired of the noise, the endless questions and the many little desires of the children, and get into a cold, hard way whereby the children's lives are crushed by unnatural rules, the play becomes funereal, the natural curiosity whereby youth drinks in knowledge at every pore is suppressed, and life becomes a truly monotonous affair, that must inevitably leave its impress upon the child's whole future development and career.

An argument frequently used in advocacy of these institutions is, that many worthy mothers are aided in the upbringing of their children, whom they could not properly maintain, owing to the fact that they have to go out working every day. This plausible argument is often, I fear, used as a cloak for much that is

poor and unsatisfactory. There are, it is true, cases in which such help might reasonably be given, but this should not be an excuse for taking over a whole family and often holding out inducements to poor people to give up the support of their children and consign them to an institution. I have always contended that if there is any one obligation more than another that should rest upon the public conscience, both of the church and community, it is the obligation to assist widows and deserted mothers to maintain and educate their children in their own little homes; for it is a fact that goes without saying that nothing else on earth can replace a mother's care and influence.

Conservation of Home Life.

In all child-protection and philanthropic work generally the true aim should be the conservation of family home life. This principle is not at all antagonistic to the Children's Aid system, but is in reality the fundamental basis of the movement. It is true that the removal of children from the control of vicious parents is advocated, but this is only as a last resort, and when all reasonable likelihood of securing better training for the child in its own home has been given up. The purification and elevation of home life is the safeguard of society, and this should ever be the end toward which philanthropic effort should be directed. That the value and importance of family life is appreciated is evident in the fact that the Act provides that if a child must be removed from immoral surroundings, or from any cause is shown to be homeless, another family home must be found for it, so that the natural order of things may be preserved.

The Curfew.

Very little has been heard of the curfew by-law during the past year. This appears to be one of those movements that is taken up with earnestness and vigor for a time, but afterwards allowed to fall into the background. While the by-law is nominally in force in many of the smaller municipalities of the province, the number in which it is faithfully carried out is exceedingly small. There is certainly great need for honest and continuous effort to prevent young children from being constantly on the streets after nightfall. It has been claimed by many that while this object is a commendable one, the passage of a special law such as the curfew will not secure its enforcement. The general argument used is that parents should look after their children, and while this is undoubtedly true, the fact remains that many parents show great indifference and never seem to consider the dangers and temptations to which their children are exposed. From the returns I have received and the statements that have been made me, I am convinced that there is need for more attention being paid to the company and occupation of children in the evening, as many of those who have gone astray owe their downfall to neglect in this particular.

Recently the following petition was sent to the Legislature by the officers of the Ontario W. C. T. U., and it presents the difficulty of enforcement very clearly: "On behalf of the Women's Christian Temperance Union of Ontario, we beg to call the attention of the Provincial Legislature to section 31 of the Children's Protection Act, which provides for the curfew ordinance. During the past four years nearly fifty towns and villages in Ontario have passed a by-law for the ringing of a bell. The majority say it is a blessing to the community and a great help to home government; a few say it is not enforced and is therefore a failure forgetting that the responsibility of non-enforcement rests with the municipality. Now, in order to make the measure more effective, we beg your honorable body to so amend the enactment that it may either be compulsory on corporations to pass it, or having passed it, to be under obligations of some kind to see it enforced. The Women's Christian Temperance Union has made the curfew bell one of its departments of work, and we find this difficulty the only serious drawback in working out the measure—that corporations pass the by-law at a venture, or at the suggestion of somebody, and then leave it in many instances to take care of itself, when after a time it is not heeded and falls into disrepute. If your honorable body would either adopt the means we suggest, or point to something better that would be a help in carrying out the intention of the law, we would be glad to do anything in our power to further the interests of so excellent a measure. Respectfully, May R. Thornley, London, Prov. Pres. Ont. W.C.T.U.; S. G. E. McKee, Barrie, Supt. Curfew Bell, Ont. W.C.T.U.; Mary Wiley, Richmond Hill, Cor. Secretary Ont. W. C. T. U.

Regulation of Maternity Boarding Houses.

At the last session of the Legislature an Act was passed "to regulate maternity boarding houses, and for the protection of infant children." Of late years public attention has been very forcibly drawn to the evil of allowing irresponsible parties to open hospitals for women, and to advertise abroad that they would "adopt" infants and save all further trouble. In these transactions the money consideration is uppermost, and as some of those engaged in the business are utterly unscrupulous, they are prepared to go any length provided the cash offer is high enough. As it was found impossible to secure the inspection and regulation of these places under any general law, the Legislation Committee of the Toronto Council, Infants' Home Board, and other philanthropic bodies, petitioned the Government for a special Act on the subject. The law as granted is not compulsory, but may be put in force by the adoption of a municipal by-law. It provides that all maternity boarding houses and houses where infants are boarded apart from their mothers, shall be under the supervision of the Medical Health Officer. Registers are required to be kept, giving particulars concerning the inmates, but this would only be submitted to the inspector. The method of disposal of children born in such houses must be made clear, and there are various clauses regulating the manner in which the children are to be given away. This branch must be conducted to the satisfaction of the local Children's Aid Society, and the taking over of infants from the parent for a money payment is prohibited.

It is hoped by this law to secure better treatment for unfortunate women, and also to ensure the safety of the health and lives of the helpless infants who are born under such unfavorable auspices.

Owing to the fact that a municipal by-law had to be passed before anything could be done, the subject has been extensively agitated in Toronto during the past few months. Dr. Sheard, the City Health Officer, made a personal investigation into the methods pursued in these establishments, and his report is all the more interesting from the fact that his enquiries led him to change from an attitude of doubt to one of unqualified condemnation of an iniquitous system. An interview with him by "Kit," of the *Mail and Empire*, presents the matter so clearly that it is worth reproducing here, for it is safe to say the same conditions prevail in every large city :

DR. SHEARD ON THE MATERNITY QUESTION.

"An interview with the Medical Health Officer, Dr. Sheard, yesterday, (November 6th, 1897), brought the conviction that the state of affairs regarding maternity houses and baby farms in Toronto was one that would not be let drop after a mere report of the matter, but would be sharply and earnestly looked into, and that proper remedies for the present deplorable state of things would be applied as promptly as is possible.

"Dr. Sheard, always an earnest man about anything he takes up, is thoroughly determined to sift things to the bottom, and see the affair through as far as in him lies. His report, an abridged account of which appeared recently in all the city journals, threw a startling light on certain shady city corners, and left no doubt, in the mind of anyone who read it, that while a very large number of unfortunate infants are disposed of in a summary fashion among so called baby-farmers, a certain number are also mysteriously spirited away and never heard of again.

"I only know of fourteen of these maternity houses," said Dr. Sheard, "but I have little doubt that there are a number of others in the city. Those that I saw were on the whole well-furnished and comfortable places The extraordinary thing about them is, however, that the tariff is nearly the same in each house, that is, $2.50 a week for board and room, with an additional charge for nursing, washing and medical attendance. For instance, during my recent inspection I called at premises in the most respectable part of the city, and on asking accommodation (presumably for a lady friend), I was shown into a sumptuous room, large, bright, airy, and was told the charge was $2 50 per week. As you and I very well know, you cannot get board and residence in the very best part of the city for such a sum as that. Then I go down to a place in the poor part of the city and am shown a room there. You can imagine what kind of a room! and asked the very same sum. This is preposterous. There must be some way in which the difference is made up. Possibly the woman who is expecting her accouchement hears of one of these places, and comes in at $2.50 per week. Then the bill begins to pile up. There may be extra charges for this and that. What is the poor victim to do? Pay or leave? Perhaps she knows of no other place to go, and having carte blanche from the man who is at the back of the affair, she agrees to stay where she is at all costs. Where the rooms are so fine and the rates so small, the keeper, or matron, may adopt out a child from its birth for the lump sum of $50 down. The mother may never have seen her child. The infant is commonly taken away immediately after birth. What becomes of it? It is, say, sent to some outside institution. The only expense the keeper of the house where it was born is at is the journey, and the few dollars it cost to stay a day there. The rest of the $50 is in her pocket, clear profit. The child is no doubt properly cared for at the institution. Those infants who are thus placed out may be considered fairly lucky, but if, on the other hand, the child is adopted out to some party living in the city, it is a different matter. There are men and women in Toronto who make a business of receiving adopted-out children. For a matter of, say, from $10 to $15 these people will agree to take 'care' of an infant. Do you mean to tell me that that child is properly fed, cleaned and dressed? Most likely it is thrown on an old mattress in one corner and let lie there till it cries for food, when a little drugged milk is given it. If it outlasts this treatment for a month or two, the man, growing tired of it, will very probably take it to the Infants' Home, or some such institution, and, telling his story of being a poor widower, out of work, etc., gets the child taken in by the kindly women who are at the

head of affairs there. So that, ultimately, it is the municipality who has to pay for the child's maintenance. And what kind of a child does it get? One whose system it ruined by drugs, whose body is unclean, whose whole physical being is undermined, and made ready for disease and corruption to do its work upon. I have over and over again seen such instances. The Children's Aid Society, the Infants' Home, the Children's Shelter, all these can answer to the truth of this. What is the consequence? When some kindly and respectable couple, who are childless, ask where a good healthy child can be found, and go, say, to the Infants' Home, there they learn the antecedents of the children, for the truth must be told. They hear that this child came here at the age of eight months, enfeebled by drugs and lack of nourishment; that it has been more or less ailing since; that this other child was received at the age of one year, and has been troubled with ringworm, or swollen glands, or some illness induced by want of proper care at first. Are these children going to be adopted? I should say not."

"But what measure do you propose to meet this horrible state of things?"

"The humane side is the first that must be examined. While I do not propose that the municipality be taxed to rear the illegitimate children that are yearly born in this city, still some way of protecting these unfortunate little creatures must be instituted. Adoption out to irresponsible parties must be stopped. Each child must get a chance, even if we've got to pay for it. Detail is a matter for after-consideration. What I propose is this. Maternity Houses must be licensed. So must baby-farms. There are four of the latter already licensed in Toronto. Among the four twelve children are farmed. The Maternity Houses should be open to bi-weekly inspection. The keepers of these places should have no jurisdiction over the infants. Their profits end with the accouchement of the inmates. A register should be kept in each house, in which the name and address of every patient, the day of her admission and departure, and whence she goes, should be entered. Also what becomes of the child born there. These registers to be submitted to the Health Department only, and to the visiting medical man. I have no desire," continued the doctor, "to hound or hunt down any poor creature who comes here to hide her disgrace. These houses being licensed, no child could be farmed out without our knowledge. The Children's Aid Society could take charge of the baby-farms, and apprise this department as to the character of the women who asked for baby-farm licenses. If the Children's Aid Society will stand sponsor for the women, I can see no reason why baby-farming cannot continue. Probably five hundred illegitimate children are born every year in Toronto, according to my report. The municipality takes care—through its various institutions—of many of these ultimately, that is, after the persons they are farmed out to, for ten dollars or so, tire of their bargain."

"Is the municipality prepared to take on any expense? What will the taxpayers say?"

"Well, of course, we cannot overload the city and ask it to rear the illegitimate children of the country, but we must protect the children. We cannot shut our eyes to the fact that these innocent and unoffending creatures are in this world, and will continue to come into this world. There is no wiping out of immorality. The situation must be faced, and reason, judgment, and humanity brought to bear on it. The only policy to pursue is to protect the children without overtaxing the community. I see no reason why this cannot be done in time."

National Conference of Charities.

An event of much importance in the history of our charitable work in Ontario was the meeting of the 24th National Conference of Charities and Corrections in Toronto from July 7-14 last. This association has held yearly meetings in all the leading centres of the United States during the past quarter of a century, but never before assembled in Canada. In the hope that the meeting of this large and influential body in Toronto would lead to the diffusion of the latest and best methods of carrying on charitable and correctional work, I attended the conferences at Grand Rapids and New Orleans, and conveyed an invitation on behalf of the Ontario Government. The Toronto city council also sent official representatives with the result that the presence of the convention was secured. The meetings which were held in the Normal School buildings, kindly loaned for the occasion by the Minister of Education, were attended by nearly 400 delegates. Every phase of philanthropic work was considered at the various meetings, while

some of the papers and sectional addresses were of great interest and value. The meeting was in every way a success, the delegates being enthusiastically pleased with their reception and entertainment in Toronto The attendance of local people, while fairly large, was not as satisfactory as it might have been. Many who are closely identified with charitable work did not put in an appearance at any of the meetings, and thus lost any benefit that might have accrued from acquaintanceship with visitors. It was expected that the deliberations of this association would lead to a more active and intelligent action being taken in local problems, but now that the meetings have been over for some time, I can see no important gain in that direction as yet. It is hoped that the organization of a Canadian conference of charities will be effected, for while we have numerous charities not only in Toronto but throughout the Province there is great need for co-operation, and the securing of economy and business methods in the management of charitable undertakings. It is now recognized more than ever before, that the great danger lies, not in the absence of charity, but in the multiplication of charitable societies to such an extent as to encourage thriftlessness and dependency, and thus bring into existence though quite unintentionally an unworthy pauper class.

REVIEW OF THE YEAR'S WORK

OF THE VARIOUS

CHILDREN'S AID SOCIETIES.

Looking over the work of the thirty Children's Aid Societies during the year, there is much that is hopeful and encouraging, for the results in the aggregate are fraught with the greatest possible benefit to the Province. Certainly all that is possible has not been realized, but there is steady growth and an increasing willingness on the part of Christian people to take advantage of the excellent laws that have been provided for the protection and care of neglected and dependent children. My relations with the officers and members of the societies during the year have been most pleasant, and it is with great thankfulness I record here the harmony and good feeling that has prevailed in all our correspondence and intercourse. The great absorbing thought in all our work has been—What is the very best thing we can do for this boy or this girl?—and all minor considerations have been swept aside. With the increasing knowledge and experience gained year by year there is every reason to look forward to a much larger work in the future, and my hope is that the weak and struggling branches of the Children's Aid organization will, during the coming year, get on firm ground, and become centres of influence for neglected and friendless children. Following will be found a detailed statement of the work of each society:

TORONTO.

The report of the Children's Aid Society of Toronto has been issued in attractive pamphlet form. This Society has made steady progress since its inception, and is now one of the strongest charitable organizations in the Province. While the officers deserve great credit for this, it is only fair to say that much of this success has only been made possible by the liberality of the

City Council in annually voting a sufficient sum for the maintenance of the Shelter, a building that in the extent and usefulness of its work gives ample return for the money expended. It is safe to say that the existence of this Shelter has been the means of saving hundreds of children from a criminal life, since it obviates the necessity of boys and girls being sent to gaol or the police lock-up, where formerly their frequent incarceration gave them an insight into and an indifference toward crime that was both ruinous to themselves and the community in which they live. The report states that during the year 350 complaints of neglect or ill-treatment of children were made at the Society's office, while 790 cases of juvenile wrong-doing were investigated in the Children's Court. Of the latter, 233 were charges of disorderly conduct on the part of boys; 135 for breach of the City By-laws; 211 for theft and 66 for trespass. The agent of the Society, Ald. J. J. Graham, was present at the private Children's Court while these cases were being disposed of, and his recommendation was considered by the Magistrate in arriving at a decision. Many of these children when found guilty, or if their detention was considered advisable until further inquiries could be made, were sent over to the Children's Shelter, where Mr. Samuel Wotton, the genial Superintendent, exerts his influence to bring about some reformation in the children's conduct. During the year 275 children were temporarily cared for in the Shelter, and of this number 48 were received from the police and truant officers, and from parents who charged the children with incorrigibility and wished to have them disciplined for a few days. The Magistrate sent 76 children for a few days' shelter and training; 44 were received owing to the misfortune of parents, and 43 on account of drunkenness and wrong-doing of parents. The disposal made in the majority of cases was their return to parents and guardians. Twenty-five of the children, however, had to be sent to corrective institutions for a term owing to their having got beyond control.

Referring to the placing of children in foster-homes and to the methods of supervision, the Report makes the following reference to this office:

"When a child has been sent to a foster-home the case is reported to the Department of Neglected and Dependent Children of Ontario. The case is there recorded, and thereafter the official visitor of the Department visits the foster-home of the child—if placed in Ontario—at least once a year; though, as matter of fact, many of the children are seen or heard from more than once. The reports which have come to us have been of the most satisfactory and encouraging kind. Where children are not old enough to have known of their connection with the Department or the Society, care is taken to make the visit in such a way that the child will only know the visitor as a friend making an ordinary call on its foster parents, for it is found that many foster parents desire to shield the little ones whom they have taken into their homes from a knowledge of the past."

The motive in this supervision is to ensure the protection of the children after they leave the Society's shelter, and as a guarantee to the people of the Province that no abuses will be allowed to creep into the foster home system.

Having visited the Society's office and inspected the records, it is my belief that every effort is being made to carry on the work in a satisfactory manner.

The Officers are as Follows:

President.—J. K. Macdonald.

Vice-Presidents.—Wm. Oldright, M. D.; W. Harley Smith, M. D.; R. S. Baird, H. R. Frankland.

Treasurer.—A. M. Campbell.

Secretary.—J. Stuart Coleman.

Agent.—John J. Graham.

Hon. Solicitor.—W. B. Raymond.

Committee.—C. P. Smith, Robert Hall, C. J. Atkinson, Rev. P. Clifton Parker, T. Millman, M. D. ; Rev. E. T. Fox, E. F. Clarke, C. D. Daniel, James Massie, James Scott, Mrs. Wm. Oldright, Mrs. J. J Follett, Mrs. J. K. Macdonald, Mrs. John I. Davidson, Mrs. C. E. Bateman, Mrs. S. G. Smith, Mrs. James Carlyle, Mrs. C. C. VanNorman, Mrs. James Ryre, Miss Wardrop, Mrs. Eldridge Stanton, Mrs. John Lillie.

Office.—32 Confederation Life Building, corner Richmond and Yonge streets.

Shelter.—135 Adelaide street east. Samuel Wotton, Superintendent.

ST. VINCENT DE PAUL.

The annual report of the St. Vincent de Paul Children's Aid Society, of Toronto, has been furnished me by the executive officer, Mr. P. Hynes, showing that the Society is actively engaged in advancing the interests of the work in their own community.

During the year ending Nov. 15, 1897 there were 275 cases reported to the agent as requiring investigation, involving the welfare of 460 children. Of these, 150 were complaints made at the Society's office, St. Vincent's Hall, corner Shuter and Bond streets, and 125 were cases of children in the Police Court. Of the latter the following disposal was made by the Police Magistrate :—Committed to the guardianship of the Society, 8 ; to St. John's Industrial School, 9 ; to The Good Shepherds, 7, the remainder being returned to their parents.

Three children belonging to the Roman Catholic Church were handed over to the Society by the Provincial Superintendent in order that foster-homes might be found for them, and three children were transferred to the Society by relatives. Eleven children were sent to foster-homes during the year and two infant wards of the Society died.

The 150 cases reported at the office were dealt with in the usual way—that is, by visiting the home complained of, urging the people to improve their conduct and giving such advice and assistance as the circumstances seemed to warrant. Temporary shelter was found for some, and situations for others. It was necessary to bring several cases into Court owing to extreme neglect and immorality, the chief cause of the trouble in these cases being liquor.

Satisfactory reports have been received concerning children placed in foster-homes, all the indications being that they are quite happy and giving pleasure to those who have received them into their homes.

The City Council has continued the grant of $500 made to the Society the previous year and this with church collections and private contributions has enabled the Society to carry on its work.

Through the kindness of His Grace, the Archbishop, the Society has been enabled to temporarily provide for children in various institutions of the diocese, thus obviating the expense of a separate Shelter.

I have visited the office of this Society and have pleasure in reporting that the books and records were in admirable condition, and reflected great credit on the agent, Mr. Hynes. It is possible, without delay, to turn up a complaint made at any time and show what action had been taken. The number of entries of visits to homes of neglect, and interviews with wayward children indicate that the officer was kept well occupied.

THE OFFICERS OF THE SOCIETY ARE AS FOLLOWS :

Patron—His Grace the Archbishop of Toronto.

President—Remy Elmsley.

Vice-Presidents—J. J. Murphy, Thomas Long, Dr. Wallace, Alderman Wm. Burns.

Secretaries—Alex. Macdonell, W. T. Kernahan.

Asst. Sec. and Agent—P. Hynes.

Advisory Board—The President, Hugh T. Kelly, Mathew O'Connor, P Hynes.

Treasurer and Solicitor—Hugh T. Kelly.

Committee—Hugh Ryan, Eugene O'Keefe, Mathew O'Connor, James J. Mallon, Daniel Miller, Martin J. Burns, William Ray, John Rogers, J. W. Mallon, Joseph Kirby, Mrs. Remy Elmsley, Mrs. W. T. Murray, Mrs. W. O'Connor, Mrs. P. Hynes, Mrs. Madden, Mrs. B. B. Hughes, Miss Mary Foy, Miss S. Walsh, Miss N. Murphy, Miss M. Macdonell.

LONDON.

The report of the Children's Aid Society of London is issued this year in pamphlet form, and in general style and attractiveness is second to the Toronto Society. It is a matter of great pleasure to me to see the growth in usefulness and enterprise of these societies, and to note from time to time the splendid progress that is being made. In London there was some difficulty in getting the work started and several meetings were held without much result, but at last two gentlemen came forward and took hold of the movement, since which time the success of the society has been assured. These gentlemen, Messrs. S. R. Break and T. R. Parker, are not now so closely identified with the work as at first, but they gave it an impulse which carried it forward to the present. The society is fortunate in having a splendid staff of officers who fully realize the need and importance of this movement, and who have fully gained the confidence of the people of London. Mr. Joseph Sanders the secretary and agent, is well adapted for this work, having for a long time been connected with the school board, and being possessed of sound judgment, which is one of the most essential qualities in a work of this kind. The presidency is in the hands of Mr. Sheriff Cameron, who cannot be too highly praised for the close and careful consideration which he has given to the details of the society's work.

In summarizing what has been done, the report states, "that during the year the Society has had forty-two children come under its care. Of these there are now in the Protestant Orphans' Home six ; the Mount Hope (Catholic) Home four ; the Salvation Army Home two ; and with their parents, two. One ward of the Society, an infant, died in the Salvation Army Home, while awaiting transfer to a foster home. Of the children sent out, two left their foster homes without leave, and without having been since recovered into the Society's charge.

"During the year there were turned over to the Society by parents and guardians ten ; by magistrates eleven ; by public institutions twelve.

"The number of applications for children received during the year was sixty-eight ; of which there were reported upon favorably forty, unfavorably ten ; laid over and withdrawn eleven ; not yet reported upon seven, total sixty-eight.

"In addition the inspector has made hundreds of visits to homes where neglected children have been reported. He has been the guardian of friendless little ones. He has been the adjuster of domestic difficulties, that but for his careful, judicious action would have ended in separations or desertion. As the active officer of the Society, he has been called upon during the year to perform sharp, energetic and clever work in the interest of neglected children, wayward young people of both sexes and of tender years, and much of this work which he is eminently calculated to discharge, must remain locked up in the breasts of those with whom he has taken counsel in his delicate work.

In outlining the purpose and scope of the Society's mission, the report states : "The feeling that the Children's Aid Society was only a multiplication of means already existing for dealing with the problems of neglected child life, is gradually but surely giving way before the conviction that the Society has a mission based on the highest principles of citizenship, as well as suggested by the most sacred of ties. If a high type of men and women are to be the characteristic of our Canadian nationality the "submerged tenth" among our young must assuredly be provided for, and the earlier their career viceward is arrested the better for society as a whole

"It is not too much to say that every child placed by the Society in a home this year, will decrease the aggregate of our criminal, inebriate or immoral jail population of ten years hence to that extent. When it is realized that this grand result is achieved with no other cost to the community than the comparatively trifling cost of maintaining the Society, it must be admitted that a grand work in the moral and material interest of our country is being accomplished. But while the community is thus advantaged, the society has the experience repeated time and again, that these same waifs, whose prospects but for the Society's intervention were so forbidding, have brought an amount of sunshine into hitherto childless homes that more than repaid the debt incurred by them to their foster parents.

"The home is the true unit and centre of our social system, and where circumstances, whether death, profligacy or desertion, have left the child homeless, the purpose and aim of the Society is to find a foster home as quickly as possible ; where, under the most perfect of available conditions, the child can possess not only the comfort, but the love, affection and regard which a true home supplies, and to the accomplishment of its purpose the Society has most

strenuously devoted itself. It recognizes that a home should not be broken up ; that the drastic remedy of separating child from parent should not be resorted to, except when it is indisputably manifest that all other and milder means fail. Much of the Society's work—work that cannot be recorded by statistics or otherwise—during the past year, has been in the direction of pointing out to careless, indifferent, inebriate or semi-criminal parents the consequences of their conduct in being deprived of their children. The warnings thus given by the Society's Inspector, the extending knowledge of the power possessed by him under the statute, and the fear of losing their children, has done what an appearance before the police court has failed in nine instances out of ten to do ; has restrained parental waywardness and restored a degree of peace and harmony in the home that justified the permanent restoration of the children to their parents, instead of their removal to shelter homes.

" The following are the officers of the Society :

President.—Sheriff Cameron.

Vice-Presidents.—V. Cronyn, F. W. Matthews, Thos. R. Parker, Mrs. E. W. Hyman.

Secretary and Inspector.—Joseph Sanders.

Assistant Secretary.—Miss Mary Groves.

Treasurer.—Mrs. John I. A. Hunt.

Hon. Photographer.—Frank Cooper.

Hon. Solicitors.—Messrs. Magee, McKillop and Murphy.

Board of Management.—W. H. Wortman, Andrew Thomson, John I. A. Hunt, Prof. Harrison, T. B. Escott, John S. Pearce, W. J. Saunby, C. B. Keenleyside, Ald. Winnett, Ald. Hunt, Mrs. Chas. Hutchinson, Mrs. (Dr.) Eccles, Mrs. P. Mulkern, Duncan C. Ross, Mrs. John Beattie, Mrs. G. B. Harris, Mrs. F. E. Leonard, Mrs. T. Macbeth, Mrs. Samuel Williams, Miss Eulie Trebilcock, Miss Annie B. Long."

OWEN SOUND.

The Children's Aid Society of Grey County continues to do an extensive work in the northern part of the Province. Rev. James Lediard, who has acted as agent, not only has attended to the cases in and about Owen Sound, but has visited and organized the work in many parts throughout the adjoining counties of Bruce and Simcoe. At the annual meeting held on November 1st in Owen Sound, Mr. Lediard presented a report giving in an interesting form an outline of the year's operations. The following extracts are taken from it :

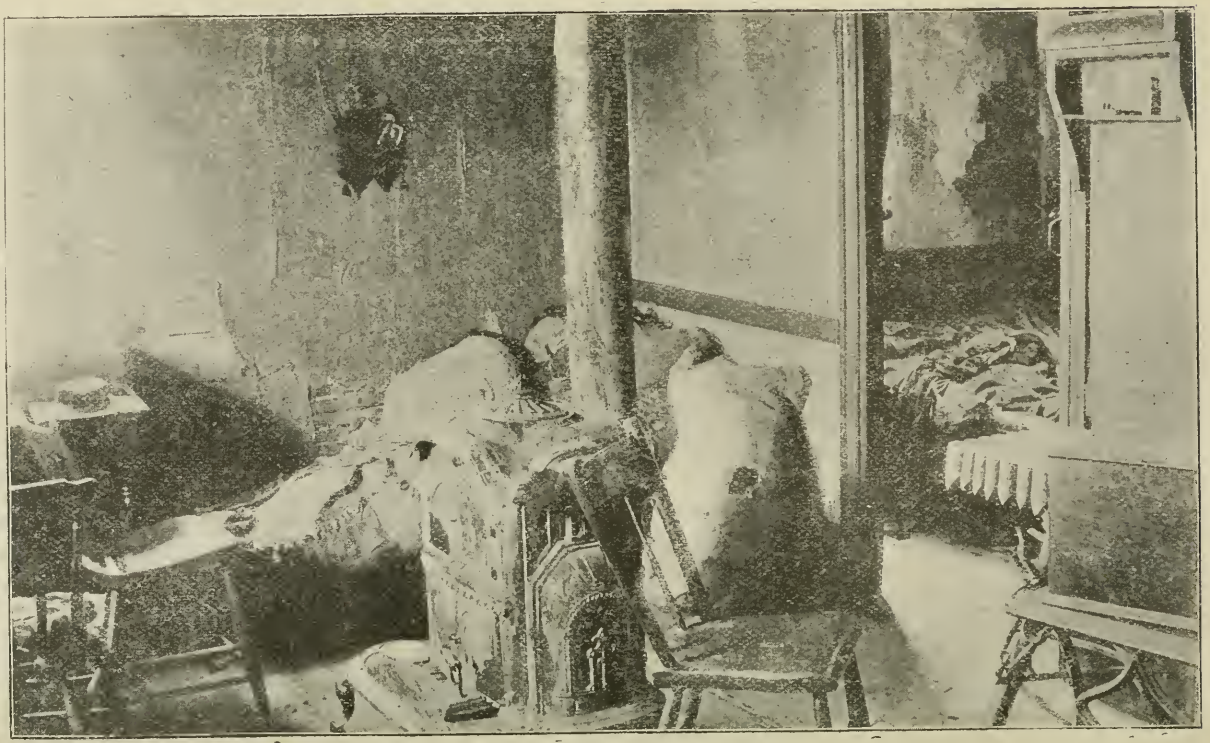
Literature.—Your agent began the year by preparing a small pamphlet setting forth the aims of the Society, the names and addresses of its officers, and also the report of its last year's operations. I have circulated 500 copies of this report and it has done excellent service by keeping the cause of neglected children before the people of this county. A considerable quantity of general literature bearing on child saving has also been distributed.

Police Court and Other Cases.—"The following cases have been dealt with chiefly through the courts :—In November two young girls were removed from the streets of Owen Sound by the police and were committed to the Society's care on the expiration of a term of institutional training. This term will end in a few days and the Society has found a good home for one and is hoping to succeed in doing so for the other. Thus giving them an opportunity to redeem themselves and become useful women.

" In January your agent visited Dundalk and after an investigation laid an information before the local magistrates and succeeded in rescuing a young girl from a house of ill-fame kept by her mother. The child was not bright or desirable, but is now making satisfactory progress in a Christian home.

" In the same month my attention was called to the condition of two illegitimate children living with an aged couple in great poverty and in a very neglected condition. They were committed to the Society by the Local Justices of the Peace, and are now well cared for in foster homes.

" In February at the request of the Children's Aid Committee I visited Durham in the interest of a family whose surroundings were of a very unfavorable character. The four children were committed to the Society's care and are disposed of as follows :—Two of them are in



INSIDE VIEW.

OUTSIDE VIEW.

"Six children, the eldest under fifteen years of age, were taken from this home within the year. The material wretchedness of the home need not be further described. But the moral wretchedness was away and beyond all, the worst. Fancy as the daily experience of six little ones, rioting, drunkenness, profanity and immorality, and then say that the Society has not a purpose. This home was in the western section of the County of Middlesex, and had become a leprosy in the section because of the conduct of the adults of both sexes residing therein. The village authorities hesitated to act because of the fear that the prosecution of the parents would throw the support of the children on the municipality. But when the Society undertook the task of providing for the children, the difficulty in the way was removed, and so was the crying shame and pollution of a dissolute abode. All the children were found good homes within a month or two of their removal by our Inspector. Reports since received are very encouraging, and all are reported well of, and in acceptable homes."—*From Annual Report, Children's Aid Society of London.*

approved foster homes. One has been placed in the Ontario Asylum for feebleminded, and the baby has been given back to the mother on her becoming married and promising to do well by the child.

"In May a visit was paid to Neustadt in this county, to inquire into the condition of a family of six children, who with their mother are all feebleminded and unable to care for themselves properly. As there was neither poverty nor immorality nor intentional neglect charged, your agent consulted with the local magistrates and some of the friends of the family, and as a result recommended that they be cared for by their relatives, of whom there were a number in the vicinity and thus secured for them the care and protection they need.

"My next visit was to Thornbury, in May, where I was instrumental in rescuing a young girl from the streets, and from the influence of a very abandoned mother. The child was committed by the local magistrates and is now safely cared for.

"In June a complaint was brought me of the cruel treatment of an illegitimate child, a bright boy of about eight years of age. Constable Shouldice, the town agent of the Society, took possession of the boy and brought him to the Shelter. A legal transfer was obtained from the mother of the lad, and he is now happily placed in a good home.

"An imbecile child has also been committed to the Society's care, and has by them been placed in the Asylum for Feebleminded at Orillia.

"In addition to this, yet coming under this head, I have to report in October the case of three children taken from very dissolute surroundings. Through an information laid by Constable Shouldice the police magistrates committed them to the Society, and one is already placed in a home.

"The last case is that of a nine months' baby. The mother is dead. The father unknown. The friends refuse support. The township council refuse to help. A kind widow with a large family has cared for it till she can do so no longer and for humanity's sake the Society has taken it in.

"Your agent has also investigated a number of minor complaints such as dissolute surroundings, begging on the streets, insubordination, cruelty, neglect, etc. But by warning, advising and expostulation the evils complained of have been remedied and the condition of the children improved.

"Visiting Children in Foster Homes.—My visits this year were exceedingly satisfactory. There were very few complaints of the children, and in almost all cases the homes were all that could be desired. The few exceptions were the result of poverty, and observation leads me to say that care should be taken not to place children in homes where the poverty of the foster parents will be a hindrance to the best interest of the child. There are about fifty children in foster homes in the County of Grey, placed by the various societies, and I think not one unhappy child amongst them, and only one sick, a young girl of sixteen years of age. She has been ill nearly six months, spending two months of the time in the General and Marine Hospital in Owen Sound, and through all this long period receiving at the hands of her foster parents the utmost kindness and attention. I am pleased to say she is recovering. There were no serious complaints of the children, and my visits were welcomed both by the children and their parents.

"Placing and Replacing.—The number of children placed in homes by your agent far outnumbers those of past years, our record standing thus:—

In 1895.....4 children were placed in homes.
In 1896..... 8, and in 1897 there were 24.

There has been but few replacements in this county this year, change being advisable in only three cases.

"During the year correspondence has grown somewhat burdensome, almost every mail bringing enquiries relative to the society's work, complaints, applications for children, enquiries as to procedure and advice asked on all conceivable subjects.

"In addition I have addressed a number of public meetings, though not as many as last year. I have also been able to give protection to three boys belonging to the English agencies, corresponding with the agents and assisting two of the boys to new homes and sending the third to Toronto.

"Work in Bruce and Simcoe.—At the request of Superintendent Kelso your agent undertook to visit children in these two counties and to act for him in the interest of neglected children as opportunity offered. As a result, I have held public meetings in Collingwood, Wiarton and Walkerton, and appointed auxiliary committees in each place—a number of child-

ren have also been visited in both counties, and in Simcoe County an important Police Court case carried through with the result that four children were removed from a very dissolute father and committed to the society's care and are now placed in homes.

"Parry Sound and Algoma District.—In addition your agent has visited the children in the above districts and reported the same to Mr. Kelso. A number of children have been placed in homes for Mr. Kelso, and a helpful correspondence with him has been carried on as to the general work.

"Summary.—Cases investigated, 10; Police Court cases, 8; children visited, 75; children placed in homes, 24; miles travelled, 2,000.

"It is to be hoped that the society and child-saving work in Northern Ontario generally will long continue to have the advantage of Mr. Lediard's services. He is thoroughly interested in this movement, has shown a special aptitude for it, and has given his services for the last three years without any remuneration.

The offices are as follows:—

President.—Mr. John Armstrong.

Vice-President.—Rev. Mr. Brown and Rev. Jas. Lediard.

Treasurer.—C. H. Moore.

Secretary.—A. E. Trout.

Hon. Solicitor.—J. W. Frost.

Medical Advisors.—Drs. Gray and Cameron.

Agent.—Rev. Jas. Lediard.

Executive.—Messrs. A. M. Anderson, M. Torhan, D. W. Morrison, D. G. Shouldice, R. B. Miller, Rev. Rogers, Mrs. D. A. Creasor, Mrs. M. Galbraith, Mrs. Bridgewater, Mrs. Rogers, Mrs. J. W. Frost.

Shelter Committee.—Dr Gray, Mrs. C. A. Fleming, Mrs. M. Galbraith, Mrs. R. B. Miller, Mrs. Jean Bibner, Mrs. W. J. Shean.

GUELPH.

The work in Guelph, which is carried on under the name of "The Guelph Humane Society," is making good progress, and during a recent visit to that city I was glad to notice on the part of the officers a strong desire to advance, in every possible way, this movement on behalf of neglected and dependent children. The Board of Officers is composed of representative citizens, and the effort made to improve the condition of children is meeting with a hearty response from all classes. Excellent arrangements have been made for a shelter, several rooms in a large comfortable dwelling having been secured, while the matron, Mrs. McRobbie, is greatly interested in the work and will give every care and attention to the children placed under her charge. The annual meeting of the Society was held in the Council Chamber on the evening of October 29, the chair being occupied by Dr. Brock. In addition to the members of the society, the City Council was represented by Mayor Hewer and Ald. Penfold, Chairman of the Committee on Relief. The Police Magistrate was also present. The annual reports showed that, in the Children's Aid branch eleven neglected children had passed through the Society's shelter the past year, more than in any year since the Society was formed. Of these four had been returned to their parents, on promise of better care; three had been sent to the Refuge or Alexandra school for girls at Toronto, it having been found impossible to deal with them in any other way, while for the remaining four foster homes were procured; one boy had since been induced to leave his home and go to the States with his elder brother. Three rooms and a play room were now at the disposal of the Society, with Mrs. McRobbie in charge—the best accommodation that

they had enjoyed. Four county cases had been dealt with the past year. The Executive had learnt the great difficulty of dealing with neglected children, or rather their relatives, but was more and more impressed with the value and need of such work.

Inspector Elliott's report stated that he had made twenty-one investigations, dealt with eleven cases of neglect and ill-treatment of children. He had given signal warnings, and had appeared before the magistrate in several cases.

The Treasurer's report showed increased charges, owing to better accommodation and more children looked after. The chief expenses were: Board of children, $134.31; rent of shelter, $28; Inspector, $40; travelling expenses in connection with children, $16.70; printing and advertising, $12.75; clothing, etc., $6.07. In all $238.63 had been expended. The main receipts were: Members' subscriptions, $68.75; Mikado committee, $75; City Council, $75.50; Fergus Council, $10.97. A small balance was left on hand.

The reports were adopted, on motion of Lieut.-Colonel Higinbotham, who warmly commended Dr. Brock's administration, seconded by Mrs. J. C. Chadwick.

Mr. T. W. Saunders, Police Magistrate, then gave an instructive address on the work aimed at by the Society in regard to neglected children, exposed to vicious and immoral influences. There were twenty-three or twenty-four statutes, he believed, dealing with child life, which showed the efforts of the Legislatures to protect children. If parents so neglected their children that there was imminent danger of them growing up to become criminals or a charge on the State, then the State had determined that it would exercise restraining and protecting influences to save the children from such a fate. He did not see, he confessed, that children grew up any better to-day, with all these agencies, than in his day, but he pointed out that population had greatly increased, and the channels of vice and wickedness were wider and more numerous, and made it necessary for humane people to put themselves forward and, to some extent, under the direction of the State, become the guardians and helpers of neglected children. A great deal has been done by the Guelph Society, he knew. Good results had been brought about without going into Court, as Colonel Higinbotham had said, and he was glad that it was the practice of the Society never to go to court, except as a last resort. If it might have appeared that he was not in full sympathy with the work of the Society, which he was, the cause of that impression, no doubt, was his expressed dislike to burden the city with the cost of incorrigible children sent to Toronto to be cared for, where the council, which paid the money, had no say in regard to the children. He would like to see such children cared for here, and the money spent in the town. Under the law, in cities like Guelph, there should be a place provided where children could be cared for temporarily, until they should be sent to private homes, or foster homes, in the Province. The city had been partly relieved of the cost of the maintenance of such a home by this Society. It had been given wide powers under the statute, and it was necessary that their operations should be carefully and jealously guarded, to prevent an abuse of these powers; he did not fear this in regard to the Guelph Society. The principle of such legislation was based on the truth that each child in the community was entitled to an inheritance in what Christian people termed the Kingdom of God, and the State only stepped in to protect the children against forfeiture of that inheritance through the vicious or immoral conduct of their parents or others. He wished the Society God-speed in their work of protecting the little ones whose interests were wantonly disregarded by their parents. He paid a high compliment to the efficiency and zeal of Dr. Brock, the past year's President. He knew he had attended to it at great personal sacrifice; and, whoever might succeed him, he regarded Dr. Brock's retirement as a great loss to the Society.

Rev. Dr. Smith gave an interesting address, and on motion of Mayor Hewer, the President vacated the chair, and Dr. Foster took the same. His Worship then moved, seconded by Mr. J. Sharp, Principal of the Guelph Business College, a vote of thanks to the retiring officers. The Mayor spoke of the greater knowledge of the work of the Society he had gained during the past year. All it needed was for the Council and the people to become acquainted with the responsibility of the municipality for its neglected children, and money to support the work would be obtained without difficulty. He spoke highly of the work of Dr. Brock and the other officers. Mr. Sharp, who was formerly Secretary of the Humane Society in Galt, spoke of his interest in this work, though he was a stranger to many of them. From his knowledge of the work done by such societies, he could cheerfully second the vote of thanks. The motion was carried.

Dr Brock and Mr. Galbraith spoke briefly in reply, the latter pointing out the growth of State responsibility in regard to neglected children.

On motion of Lieut.-Colonel Higinbotham and Mrs. Goldie, it was decided to reduce the minimum memberseip fee from $1 to 50 cents.

On recommendation of the Executive the following were chosen officers for the ensuing year :—

President.—E. R. Bollert.

1st Vice-President.—Mrs. T. Goldie.

2nd Vice-President.—F. W. Galbraith.

Secretary-Treasurer.—J. Sharp.

Hon. Solicitor.—A. H. Macdonald, Q.C.

Inspector.—T. D. Elliott.

Executive.—Mesdames, J. C. Chadwick, J. C. Keleher, J. B. Powell, W. M. Foster, J. C. Smith, H. Howitt, F. C. Harrison ; Misses Robertson, Girdwood, Masters ; Messrs. Dr. Brock, Lieut.-Colonel Higinbotham, J. M. Bond, Capt. Clark, A. F. H. Jones, Wm. Tytler, Alex. Stewart, M. O'Connor, J. E. McElderry, James Cormack, and all resident clergymen.

HAMILTON.

The Children's Aid Society of Hamilton has done a splendid work during the year in finding foster homes for nearly thirty children—some of whom had been for several years in public institutions. The saving to the community, not to speak of the benefit to the children themselves, should heartily commend the Society to the favorable consideration of the municipal councils. Strange to say, although Hamilton is one of the most important cities in the province, the Children's Aid Society has received less financial aid from the city and county councils than many of the smaller organizations. The great truth is evidently not yet realized that every dollar expended in child-saving is repaid ten-fold in the young lives that are saved from prison careers and helped on to respectable citizenship. Hamilton is unfortunately too well represented in our penal institutions, and if properly supported the Children's Aid movement is calculated to stop this social wreckage. There is no Children's Shelter in Hamilton as called for by the Act, and consequently no adequate means of dealing with wayward children before they become hardened in wrong-doing. I hope I may be pardoned for reproducing here the address of Mr. Justice Street when dealing with the number of boys brought before him in Hamilton for serious offences.

At the assizes in September, 1896, the grand jury referred to the number of serious crimes committed by youths which had come before them, and while commenting on the establishment of industrial schools for the reformation of erring youths, expressed in their views the desirability of such legislation as would prevent the further importation of the class of children now being brought out from the slums of the European cities.

In reply, His Lordship said :—"I am glad you have called attention to the prevalence of crime amongst the youths of Hamilton, and that you have taken so much interest in suggesting something you think may be a remedy for it.

"I have been looking into the history of the young men convicted of some of these serious crimes at the present assizes and I find that it is not imported criminals at all as a rule ; that, in fact, with one exception they were all young fellows who had been brought up in the city of Hamilton and who have been educated at the public schools, so that if these are a fair specimen of the criminals who are causing the outburst of crime in Hamilton the remedy you suggest of prohibiting the importation of people from other countries is not going to help it.

"It is necessary to look nearer home and consider whether the system under which these children are brought up is the system that is most likely to make good citizens of them. I have a very strong conviction myself that it is not.

"These young fellows were in the public schools where they are never taught, as far as I understand, any principles of morality at all. They are simply taught reading, writing, arithmetic, and a smattering of other things, but they are not taught the difference between right and

wrong. My impression of the way in which a great many children are brought up in the schools of this country is that they grow up without any idea that a thing is right or wrong, and that if they are found out in the commission of any offence they are very sorry they did it.

"Of course it is very hard to suggest a proper remedy, but still we have four or five boys who have been brought up at your public schools which have been so highly recommended, and here they are convicted of these abominable crimes.

"I am very much afraid that your suggestions are not going to help, as long as we do not take better care in teaching our own children the difference between right and wrong."

This address indicates the need for greater effort to prevent children drifting into criminal ways, and if given proper financial recognition by the city council the Children's Aid Society could save thousands of dollars and many children to the country. No men are better known in the province for their philanthropic services than such officers of the Society as Mr. Adam Brown and Rev. Thomas Geoghegan, while the Secretary, Mr. William Hunter, has special qualifications for child-saving work.—But they cannot work miracles with $100 or $200 per year income.

The annual meeting of the Society was held on April 23rd last. The report of the Secretary submitted at that meeting stated that during the year eleven business meetings were held, thirty-seven cases of neglected and dependent children were submitted, four cases were brought before the police magistrate, four children were taken from a drunken and depraved parent and placed in a home under the care of the clergyman whose church they had been connected with, twenty-two children were placed in foster homes, three were transferred from the Home of the Friendless to the care of the Society and were sent to the Provincial Superintendent, who had undertaken to place them in homes; fifteen were transferred from the Girls' Home to the care of the Society.

Since the annual meeting the agent and Secretary, Mr. William Hunter, reports as follows: ten business meetings have been held and about fifty neglected children have been dealt with, twenty-six children have been placed in foster homes. The chief cause of neglect may with safety be put down to liquor, an instance of which may be cited:—'A woman who had three girls and a boy frequently gave way to drunkenness and allowed her house to become a resort for the very lowest of characters, and it was absolutely necessary to remove the children.' This represents one of a great many. Another case:—A family of four children, mother kept a disorderly house, children in a terrible state of dirt and filth, the children have been placed in the Girls' Home until foster homes can be got. The work is going on very satisfactorily and no cases of neglected or dependent children escape our notice.

"The Society have received about ninety dollars during the year, over thirty dollars of which was contributed by a number of little girls from a sale of work held at the Beach residence of Honourable J. M. Gibson."

The chief officers are:—

President.—Adam Brown.

Vice-Presidents.—Lieut.-Col. Moore, W. H. Wardrope, P. D. Crerar, Dr. O'Reilly.

Agent and Secretary.—William Hunter.

Hon. Solicitors.—W. Churchill Livingston, W. S. McBrayne.

Executive Committee.—Mayor Colquhoun, Rev. T. Geoghegan, Dr. Rennie, Hon. W. E. Sanford, W. H. McLaren, George Rutherford, Hon. J. M. Gibson, J. F. Scriven, Mesdames Billings, Evans, Stuart, Urquhart, Gibson, Malloch, Beasley, Lawson and Duff.

GALT.

At the request of the officers of the Children's Aid Society of Galt and south Waterloo, I attended a large and representative meeting, held in the Town Hall, on the evening of December 21st, at which the subject of child-saving was considered. Calling on a number of leading citizens during the day I was greatly cheered to find a strong public sentiment prevailing on this important question. All seemed to agree that no work was more important and none more deserving of hearty recognition and support. The officers of the Society are all splendid people, commanding the confidence of the community and they work together with a singleness of purpose that is worthy of emulation. It was in this district that the lad Allison, recently convicted of murder, was raised, and the facts that have been brought out showing the lack of moral training in his case have led many to see the necessity for more vigorously insisting on proper home surroundings and training for boys and girls who are growing up to form the citizenship of our country.

The Secretary of the Society reports as follows :—During the past year five children have been placed in good homes. A number of cases of neglect and ill treatment have been investigated. Aid in money and clothing has been rendered to parents in poverty. It was found necessary to send one young girl to the County Jail on a charge of vagrancy, but on her release she was sent to friends in Ohio who promised to look after her. The chief difficulty experienced has been in providing a temporary shelter for children till suitable homes were found. The Board looks forward hopefully to the future. The means at its disposal have been small, yet enough has been forthcoming to meet present needs.

A grant from the town council of twenty-five dollars, contributions to the amount of seven dollars from a collection box placed in one of the stores and about twenty-three dollars from subscriptions and membership fees made up the greater part of our revenue. Our expenditure was principally for clothes and board for the children placed in the temporary shelter and a little relief to outside cases of distress.

The Society feels itself indebted for the hearty co-operation of the Magistrates of the town and the kindly notices from the local press and for assistance and advice given by Mr. J. J. Kelso, Superintendent of Neglected Children, Toronto.

We are confident that the presence in the town of a Children's Aid Society, is, in itself, a preventative of cruelty to and neglect of children within the municipality.

The officers for this year are ;—

President.—James R. Cavers.

1st Vice-President.—James K. Cranston.

2nd Vice-President.—Mrs. Wm. Graham.

Treasurer.—Mrs. Alexander.

Secretary.—James E. Kerr.

Honorary Solicitors.—Messrs. Beaumont & Irwin.

Agent.—Adam Kay.

KINGSTON.

The Children's Aid Society of Kingston has been making very good progress during the year, but has suffered great loss in the resignation of Rev. J. R. Black, who, during the past three years, has been the energetic and self sacrificing agent. At the annual meeting held on October 18th, last, it was reported that during the twelve months, thirty-three cases had been dealt with, involving the interests of seventy-seven children. The courts have been appealed to in eight of these cases. Eleven children had been sent to foster homes, fourteen were returned to their relatives, twelve infants had gone out with their mothers, and five infants died.

The Treasurer's statement shows that the expense of the year has been $1,802, while the receipts amounted to $1,513, leaving a deficit of $289. The city council contributed $200, and

the county council $50. Some complaint was made by the various speakers that the work being of a general character and in the interests of the whole community should be more liberally supported from public funds. The city and county councils contributed $250, and the balance was made up by private subscriptions.

The work of this Society is different from that of any other in the Province, since it includes under the one management an Infants Home and Shelter for young mothers and their infants. Some time ago the Society undertook the purchase of a large building, paying for which and the subsequent cost of maintenance has been a serious drain on the finances ; and it is greatly to the credit of the ladies that they have been able to carry on this department so successfully and collect so much money. It is a question, however, if the work could not be more advantageously carried on if both branches were conducted by separate committees, working under the one general Board, with the funds for each object kept entirely distinct. There is, it seems to me, some risk in placing boys and girls in the same Shelter with a number of nursing mothers, but suitable arrangements will doubtless be made to keep the children entirely apart from the women inmates.

During the past year this Society had an expensive law suit over the right of appeal from a magistrate's decision. A family of children was committed to the guardianship of the Society by two Justices of the Peace, and an appeal was taken by the father from their decision to the Court of Quarter Sessions. The solicitor of the Society held that no such appeal could be made, and this contention was upheld by Mr. Justice Moss at Osgoode Hall. The case was further carried to the full court and the decision of Mr Justice Moss was upheld. In order to assist the Society in this unusual expense the Ontario Government made a special grant of $100.

Hon. President.—Rev. J. Edward Starr.
President.—Mrs. R. T. Walkem.
Vice-Presidents.—Mrs. W. Macnee and Mrs. Ward.
Treasurer.—Mrs. McCammon.
Recording Secretary.—Mrs. C. Neal. (Assistant) Mrs. W. Moore.
Chairman of child rescue Work.—E. J. B. Pense.
Secretary.—Prof. Dyde.
Hon. Solicitor.—G. M. Macdonnell, Q.C.

OTTAWA.

The Children's Aid Society of Ottawa has made considerable progress during the past year. Mr. John Keane was appointed secretary and agent in February last, and has proved himself to be well qualified for the office. In the past I found it difficult to secure replies to letters concerning the progress of the work, and there was an absence of method in dealing with the various children brought to the attention of the Society. A number of children committed to the Society were placed in various institutions in the city and allowed to remain indefinitely, while committal papers were either not secured or lost trace of. Mr. Keane, who is also Secretary of the Associated Charities, has made decided progress and was able to report recently eleven children placed out in good homes under the auspices of the Society. The annual meeting was held on Thursday, October 14, when reports of a satisfactory character were submitted. It was stated that fifty-six separate cases of neglected children had been dealt with, the number of children affected being about ninety-seven. In many cases a change or amendment has been secured through the parents themselves, the intervention of the officers leading them, through

motives of encouragement or shame, or fear of losing control of their children or of being prosecuted, to alter their course and look after their little ones. This preventive work has been most marked and was one of the excellent features of the Society's operations.

The officers are as follows :

President.—Mr. H. B. Small.

Vice-Presidents.—Lady Ritchie, Mrs. F. McDougall, Miss Seymour, Rev. Father Whelan, Rev. Canon Pollard and Mr. John Gorman.

Hon. Treasurer.—Mr. John R. Armstrong.

Secretary.—Mr. John Keane.

Hon. Solicitors.—Mr. F. R. Latchford, Mr. W. A. D. Lees.

Council.—Ven. Archdeacon Bogart, Mr. Sheriff Sweetland, Mr. W. L. Scott, Madame Frechette, Mrs. Bauset, Mrs. C. A. Gough, George S. May, Mrs. E. A. Mara, F. R. E Campeau, Miss. Sinclair, M.D., W. Ashe, Ald. Stewart, Ald. Campbell, Mrs. B. Sulte, Mr. E. P. Stanton, Mr. J. Hervey Spencer, Mrs. J. Thornburn, Mr. W. F. Boardman.

BELLEVILLE.

Work for neglected children in Belleville and Hastings County, has many good friends, but there has been considerable difficulty in getting much accomplished, owing to the lack of funds and the fear on the part of magistrates that the municipality would be unduly burdened with the expense of maintenance, etc. One of the hopeful signs, however, was the recent action of the City Council in making a grant of $100 to the Society by which encouragement has been given to those who are anxious to act up to the spirit and intention of this law. There is, undoubtedly, a good work possible in this district, by which a great saving may ultimately be effected, if only the work is vigorously carried on.

I have received from the Secretary the following resume of the Society's progress since its inception, which will give an idea how matters stand :

"In presenting a report of the Belleville Society, a reference to its history and growth may be of interest.

On the 8th of October, 1894, the Belleville Humane Society was organized. This did not include the work for neglected children. On the 2nd of November of the same year, Mr. J. J. Kelso visited this city and addressed an influential meeting of the citizens interested in philanthropic matters, explaining the object and provisions of the Children's Act. At that time nothing was done towards the formation of a Children's Aid Society.

The Humane Society, however, after carefully considering the matter decided to take up the work and made application through Mr. Kelso for the powers of a Children's Aid Society, and an Order-in-Council was passed on 7th of May, 1895, recognizing the Society as duly qualified to enter upon the work. Almost as soon as the Society was legally qualified to act, a bright little boy of four years old was taken from the care of a dissolute woman and committed to the Society on the Magistrate's order. The child was speedily placed in a foster-home by Mr. Kelso where he is happy and has very bright prospects.

Since that time seven other children, five girls and two boys, have been rescued from almost certain lives of vice and crime, and through the kindness of the Rev. C. W. Watch, of Brighton, placed in comfortable Christian homes, enjoying day and Sabbath school privileges, with every prospect of growing up into good citizens, instead of becoming a blot on society, and an expense to the community.

The reports from them are most encouraging, and are an incentive to greater exertion in this noble work.

In addition to this, complaints have been made concerning 16 or 17 homes that the children were either neglected, sent out to beg, or that the surroundings were bad. Over 40 children were in these homes. The cases have been investigated, and the homes visited, and the parents warned that unless a decided improvement was made at once, the Society would proceed to put the law in force. At first our indefatigable agent, Mr. G. S. Johnston, met with pretty warm receptions from some of the parents, but when they found that he had the power of the law at

his back, they promised reform, and this was soon seen in better clothing, cleanliness, better care, tidier homes and a greater watchfulness over their children's actions. I think one of the most important results of the Society's work in Belleville is the fact that these people who neglect their children have found out that there is an organization that can have their children taken from them, and that permanently.

Numerous cases could be cited, but the following will do as a sample: An old woman, whose house was not conducive to either the moral or intellectual growth of a child, some years ago took a little girl to bring up. The girl is now about 13 years of age, and the Society decided to remove her from such a home. When the child was brought before the Magistrate, the old woman, who evidently loved her, pled piteously to be allowed to keep her, promised to reform, and to send the girl to school, and she has since performed what she promised.

Our work from the very first has been very much hindered by want of funds to carry it on. In February last, Mr. Kelso visited the city, and met the members of the Society and a large number of influential persons who did not know the object and powers of the Children's Act. He fully explained these, and several expressed themselves as heartily in sympathy with the work, among others, Mayor J. W. Johnson very decidedly. As a result when a deputation waited on the council they generously granted us $100 to carry on the work.

The effect of this is twofold, it relieves us financially, giving us a chance to extend our work, and it also gives us a recognized standing in the city and community. Notwithstanding all the drawbacks I feel that we have done much good, though not all that we could have done had we not been financially embarrassed. I also believe that better times are coming when the Society will be able to do more good than it has been able to do."

The Officers Elect are:

President—Curtis Bogart.

Vice-Presidents—Mrs. Flint, Mrs. R. J. Bell and Miss M. Holden.

Treasurer—Mrs. Flint.

Secretary—S. A. Gardner.

Asst. Sec.—Miss Urquhart.

Agent—G. S. Johnston.

Committee—Mrs. Ritchie, Mrs. Duncan, Miss Anning, Miss Ritchie, W. C. Mikel, W. N. Ponton and Chief of Police Newton.

ORILLIA.

The annual meeting of the Orillia Children's Aid Society was held in the Council Chamber, on Thursday evening. Mr. C. J. Miller, J.P., Vice-President, occupied the chair, and Mr. W. Grant, Secretary, read his report as follows:

In again presenting his annual report your secretary finds occasion for thankfulness not so much in the volume of work undertaken by the Society as in the successful results of what has been done. Encouragement is thus given to further use the means which the Society has at its disposal for the assistance of helpless and distressed childhood. Since our last meeting two children from other towns have been placed in satisfactory homes in this neighborhood, and are becoming absorbed into happy home life. Two others have been taken into the care of the Society; one a motherless boy of about nine years of age, whose father had deserted him, has been placed in a home in a neighboring town, and is reported on satisfactorily; the other, a girl of the same age, destitute and motherless, has been placed in care of a married sister, as a ward of the Society. This sister has, not wisely, allowed the child to be moved to another home, without first consulting any of the members of our Society. Should her present home prove undesirable, this child, who is now the legal ward of our Society, will be taken possession of again and placed elsewhere. Of the several children for whom foster homes were found in the earlier days of the Society, continued reports and visits confirm the happy results formerly observed, and these little ones are now growing up in surroundings far preferable to those from which they were taken. The service of formal notices upon some parents who were careless and

negligent of the welfare of their children has been found to effect an improvement in some instances, and to answer the purpose of more extreme measures. Our thanks are due to the local and county press for free insertion of advertisements and matters of interest to our Society, and to the manager of our temporary shelter, for her kindly interest in children placed in her charge. We continue to have the ever willing advice and help of the Provincial Superintendent, Mr. Kelso, and his assistant, Mrs. Harvie, who both appear specially suited for the work in which they are engaged. Above all do we owe our gratitude to Him from whom all blessings come, and who has made special provisions for these little ones, in that "their angels do always behold the face of our Father which is in Heaven."

Reference was made to the satisfactory character of reports received concerning children visited in their foster homes by Mrs. Harvie, of the Provincial office. The Treasurer reported an over-expenditure of eighty-four cents. The reports were adopted, and a well-deserved vote of thanks tendered the zealous and efficient Secretary and the members of the Emergency Committee.

The office-bearers for the ensuing year are :

President.—Wm. Thomson.

Vice-Presidents.—C. J. Miller and George McKee.

Secretary-Treasurer.—Wm. Grant.

Agent.—G. Dreyer.

Honorary Counsel.—F. G. Evans.

Committee of Management.—Geo. Thomson, J. W. Slaven, W. I. Forbes, H. T. Blackstone, A. H. Beaton, M.D., J. H. Wilson, G. H. Hale, T. G. King, Dr. A. R. Harvie, H. L. Crawford, Mrs. Wm. Todd, Mrs. Greene, Mrs. R. N. Grant, Mrs. H. M. Christie, Mrs. T. B. Lafferty, Miss Stewart, Miss Allen, Miss Overend, Mrs. Shire, Mrs. Burns.

Finance and Audit.—J. W. Slaven, W. Todd and W. I. Forbes.

Temporary Home Committee.—Mrs. Main, Mrs. Shire, Miss Stewart, Mrs. Todd, Miss Overend.

Foster Home Committee.—G. H. Hale, F. G. Evans, W. Grant, Mrs. Greene, Mrs. George Thomson, Miss Allen, Mrs. Cashman, Mrs. Weeks and the chairwoman of the Temporary Home Committee.

Emergency Committee.—The President, Vice-Presidents and Secretary.

The Secretary was instructed to request the Council to have the ringing of Curfew resumed, and take whatever steps may be necessary to secure the due enforcement of its by-law. It was the opinion of all present that the by-law had exerted a beneficial influence in causing careless parents to see that their children were home in good season at night. All that is needed is an occasional reminder from the proper officer that neglect in this matter will result in the parents receiving an invitation to interview Police Magistrate Lafferty, to remove these children from the pernicious influences of a street education, and the townspeople of the nuisance of noisy lads congregating in the streets after night fall.

When the business was done, a profitable conversational discussion of the work of the Society took place Several sad instances of neglect of children were considered, and wherever practicable the Committee will endeavor to bring about an improvement of environment, or place the little ones in better homes. It was stated that in almost every case these children are the victims of the liquor traffic.

CHATHAM AND KENT COUNTY.

The Children's Aid Society of Chatham and Kent County has not made as much progress during the year as I expected. While the principles and aims of child-saving work are cordially endorsed by all the leading citizens, it has been exceedingly difficult to get together an enthusiastic board of officers, or to collect sufficient funds to enable the work to be carried on with any degree of success. For over two years Mr. J. S. Butler took hold of the work, and as agent of the Society was accomplishing splendid results. He found, however, that while he was acting

in a voluntary capacity, there was a disposition to place the whole work on his shoulders, and notwithstanding the earnest solicitations of those who knew something of his work, he decided to resign his position. There was every indication that the work would come to a standstill, but at a meeting held later Mrs. Shackleton, who from the first had taken a warm interest in the movement, was pursuaded to accept the position of agent. Notwithstanding much discouraging and disheartening indifference encountered, Mrs. Shackleton has been doing her best up to the present time to make the needs known and the importance of child-saving appreciated. Through her instrumentality numbers of children have been benefited, but as no grant of any kind has been made by either the city or county council, and as the charitable public have not come forward, the work is still in an unsatisfactory state. With the hope of increasing the interest in the work, I visited Chatham in November, but only an audience of about twenty-five could be got together on that occasion.

Note.—Since writing the above I received the very pleasing news that the county council of Kent, at their last meeting voted the Society $100.00, so that there is much to encourage the friends of the work to persevere. Now that the county council has taken action it is likely that the city will also assist and thus give tangible evidence of their interest in this work for the homeless and unfortunate children of their district.

WINDSOR.

The Humane Society of Windsor has not been inactive during the past year. This Society is fortunate in having an energetic agent, Mr. J. P. McEwan, and a Children's Shelter, the Carey Home for Children, which has been affiliated with the Society for the care of neglected and dependent children. In speaking of the work, the Secretary writes as follows :

"The work of the Society for the year 1897 may be briefly summarized as follows :—The cases relating to neglected and ill-treated children are Windsor, 7 cruelty, 9 neglect ; Sandwich, 1 cruelty, 6 neglect and cruelty ; Amherstburg, 4 neglect and immoral surroundings ; Sandwich East, 1 cruelty ; Leamington, 3 neglect ; Kingsville, 2 cruelty ; Essex, 2 neglect ; Sandwich West, 1 cruelty ; Harrow, 1 cruelty ; Walkerville, 1 cruelty ; total, 38.

"Children committed to the Carey Home, 8 ; children committed to the London Roman Catholic Home, 6 ; children adopted, 4 ; total of 18.

"One very aggravated case of cruelty may be mentioned as a sample of the work done by the Society. Flossy K———, aged three, was frequently whipped by an inhuman stepmother, who used a leather strap in which nails had been driven. The child was beaten until the blood ran down her back and legs. When the case was taken in hand by the Society's Prosecuting Agent, Mr. J. P. McEwan, the woman fled, with the child, and sought refuge in the United States. She was, however, followed, and her return was effected. The case was tried and the stepmother was imprisoned for a period of six weeks. The child was taken by the Society and placed permanently in the charge of Mrs. V———, where she is given every possible care and is in a good home.

"There have been twenty-four cases of cruelty or neglect, in which a warning delivered by the Society's agent has had the most beneficial results. Many children owe to the Society the recognition of their rights in homes where otherwise cruelty and neglect would have been their lot.

"There have been about one hundred and seventy-five cases of cruelty reported and dealt with by the Society in various parts of the County of Essex. Convictions have been made in Colchester, Sandwich West, Rochester, Maidstone, Sandwich, and quite a number in the city of Windsor. The number of cases has been less than those of the past two years, but some of them have been of a much more aggravated nature, which shows that the work of the Society is telling."

The Carey Home has not had many children in residence during the year, and I fear some of the ladies must have been discouraged on this account. There is the comforting reflection, however, that an empty institution is preferable to a crowded one, provided, of course, that the

children are not being neglected. I have thought that possibly this Home could be used as a temporary shelter for the south-western counties, particularly Chatham, as the distance is not very great and the removal of children from former surroundings would be a decided gain. This is a point that might, perhaps, be considered during the coming year.

The officers of the Society are as follows :

President.—Archibald Whittaker.

Vice-Presidents.—James Templeton, A. W. Joyce, J. E. Johnson (Leamington, Ont.), Thomas Reid (Walkerville, Ont.)

Hon. Secretary and Acting Treasurer.—Geo. S. Hodgins.

Hon. Solicitors.—R. F. Sutherland, F. C. Kirby.

Veterinary Surgeon.—William McEachran.

Prosecuting Agent.—James P. McEwan.

STRATFORD.

The Perth Humane Society which has for its jurisdiction not only the city of Stratford but the county of Perth, has had a very successful year and is now one of the strongest societies in the Province. Early in the year an old resident of Stratford, Mr. Wm. Battershaw, gave the society the generous sum of $500 to aid them in their work for children. This has been invested and will form a permanent fund, the revenue from which will be devoted to improving the condition of neglected and dependent children. The city council made a grant of $100 in recognition of the good work being carried on, and quite recently a gentleman who does not wish his name known, gave the Society the sum of $100 to be expended during the winter in providing clothing, etc., for poor children. There is a membership of over one hundred, and the Society enjoys the good will of the whole community. During the year 5,000 circulars explanatory of the society's objects were distributed throughout the county and a large number of clergymen, at the request of the Society, gave special sermons in its advocacy.

The annual meeting of the Society was held on October 15th last, in the City Hall, and owing to the activity of the officers, especially of Miss R. McKenzie, in providing an attractive programme, and letting the time of meeting be widely known, the large hall was crowded to the door. I had been invited to attend and give an address and it was a matter of surprise as well as pleasure to see such a magnificent gathering. Many of the young people of Stratford were present, and it is safe to say that in many of these young lives the fruits of humane teaching will manifest itself in later years. Mr. Wm. Buckingham who occupied the chair read the report of the year's work, the following reference to child protection being made :

Four prosecutions were instituted for selling tobacco and cigarettes to minors. Of these, three were fined $10 and costs, and one was let off on suspended sentence.

Cases of warnings to parents for neglect of children, twelve. The father of one neglected and ill-used family was sent to jail. Two of the children were taken care of by the Society, and one of them was provided with a good home.

Many parents who ill-use their children are by no means willing to lose them, and as the Children's Aid Society possess large powers, it acts as a strong deterrent. So that in the other instances where prosecutions were threatened or commenced, the parents are now doing much better for their children, and it is hoped further proceedings will not be required. The same fear of the removal of the children from their vicious influences has led to the reformation of drunken fathers. Drink has been found to be the principal cause of the suffering and destitution of the little children who have come under the Society's notice.

Complaints in eight other cases led to investigations, which in themselves were sufficient to avoid the necessity of formal warnings.

A large share of the work done this year by the agent extended to the surrounding county, more particularly to the townships of Ellice, Downie, north and south Easthope and Fullarton, showing that the operations of the Society are not confined to the city, but are far reaching in their influence. It should, however, be remarked that the usefulness of the agent is much lessened by the unwillingness of people to report cases to him and to substantiate the facts before a proper tribunal. Fault is sometimes found with the agent by the very people who refuse to aid him in the performance of his duty, and who expect him to be in all parts of the city at the same time, and see to everything that is going on everywhere for himself.

The officers of the Society are :

President.—A. A. Mavor.

1st Vice-President.—Mrs. J. H. Nasmyth and P. Dierlamm.

2nd Vice-Presidents.—J. Read and Mrs. Hyslop.

Secretary.—Miss Ruby McKenzie.

Honorary Solicitor.—J. J. Coughlin.

Treasurer.—D Duggan.

Council —Ladies : Mrs. D. M. Fraser, Miss J. Ballantyne, Mrs. Buckingham, Mrs. Duncan, Miss Hopkirk, Mrs. O'Beirne, Mrs. Shaver, Mrs. J. A. Duggan, Mrs. Carman, Mrs. Rennie, Mrs. Megan, Mrs. O'Flaherty, Miss A. Wells, Mrs. O'Connor : Gentlemen—Wm. Buckingham, Jas. O'Loane, J. R. Stuart, W. J. Ferguson, Wm. Steele, V.S., Geo. Durst, John Read, W. H. Copus, J. Clarke, V.S. : Duncan Stewart, J. L. Bradshaw, John Idington, Q.C. and J. H. Nasmyth.

PETERBOROUGH.

The Children's Aid Society of Peterborough has been advancing steadily, and as a result of several meetings held in the fall, has gained the good will and co-operation of many who had been inclined to stand aloof. At the annual meeting Mr. Hampden Burnham, who from the first has been the Honorary Secretary and active promoter of the Society resigned his office. This was accepted by the officers with the greatest regret and in the hope that Mr. Burnham's valuable assistance will still be given in the direction of the work; During the year the need for further development in rescue work was forcibly brought to the attention of the citizens, by the large number of complaints made concerning immorality among the young and the prevalence of street walking after dark by young girls. Public meetings where held in October, when it was unanimously decided that greater effort was necessary if the rising generation was to be prevented from drifting into evil and pernicious habits, and the ladies of Peterboro' showed an earnest desire to co-operate and bring about an improvement. Mrs. Harvie, by special request, visited Peterboro' and gave an address on preventive work, and committees of ladies were appointed to further the objects of the Society. Since that time a commodious building has been secured for a shelter through the kindness of Mr. Henry Best in giving the premises rent free, and the Council, in addition to tax exemption, has made a grant of $200. The prospects are, therefore, that a largely increased work will be done in the future and much good accomplished.

During the year the Society took hold of a family of children in an outlying township, who were being brought up in the greatest filth and destitution. The children were committed as wards of the Society and have been placed in foster homes, several of them through the agency of the Rev. C. W. Watch. A similar case, also, in the back district was dealt with, and one boy given over to the Society who, in all probability would have developed in a few years into a worthless and ignorant tramp. Several other cases have been dealt with by the agent Mr. Miller, and parents warned to improve their conduct. In addition to sending eight children to foster homes, four police court cases were dealt with.

The Officers of the Society are as Follows:

President—James A. Hall.

Vice-Presidents—A. C. Dunlop and Mrs. J. B. McWilliams.

Sec.-Treasurer—Miss Clarke.

Solicitors—E. B. Edwards and R. M. Dennistoun.

Agent—F. W. Miller.

Committee of Management—Mrs. Beck, Mrs. J. McKee, Mrs. A. L. Davis, Mrs. G. F. Warde, Mrs. O'Sullivan, Miss Martha Dickson, Miss Beck, Mrs. J. Gilchrist, Rev. Dr. Torrance, Rev. Father Scanlan, Rev. J. J. Rae, Rev. H. Symonds and Messrs. W. B. Bamford, J. J. McBain, Peter Campbell, J. L. Hughes and Mayor Yelland.

LINDSAY.

During the past year I visited Lindsay and gave an illustrated talk on Child-saving work. I found the officers and members of the Society anxious to advance the interests of neglected children in every possible way. The Secretary reports that during the year six meetings have been held, and the cases of six children who were known to be neglected, had received attention. The interference of the Society has been less necessary this year than the previous one, owing to the improved condition of affairs, which is a matter for congratulation. Members of the Society have assisted this office in placing children in homes in Victoria County, and have also aided in the supervision of children placed out.

The report concluded as follows: "We can safely say that the children for whom homes were found in this neighborhood under the Children's Aid Act, are doing well and are the recipients of the blessings that follow their being under salutary home influence. One child in which the Society took an interest is worthy of special mention. A feeble girl baby eleven months old, was carried about the country in its mother's arms from house to house, taking shelter wherever night overtook them. The exposure to cold, hunger and unsanitary conditions was making rapid inroad on the child's health. It was often sick, and became weak, feeble and emaciated, nigh unto death. Our Society took the case in hand and became possessed of the child, and kept it in a temporary home under good care for a few months, until it became healthy and thriving. It was so well cared for by a kind heart and gentle hands, and the child grew so rapidly in favor, that it was adopted by the woman caring for it as her own. The foster-parents love the child and are true parents to it. The new mother said she believed the Lord had sent the child to fill a void in her heart caused by the sudden death of her own infant—a little girl—a few months before. Not only is the child clean, healthy and thriving, but the foster-mother is happy and rejoices in her new charge. The unfortunate mother is still adrift. There are many childless homes, and homes with vacant cribs and empty chairs, that our Society hopes to make happy by placing there some neglected child. The books of the Society were audited March 19, 1897. Balance on hand, $18 46. The County Council generously donated the Society $25, and the Town Council supplemented the members fees with $20."

Officers:

President—J. W. Boxall.

Vice-Presidents—Thos. Brady, J. R. McNeillie, J. H. Knight.

Honorary Vice-President—D. Ray.

Treasurer—Mrs. Trew.

Secretary—Dr. W. L. Herriman.

Assistant Secretary—Mrs. D. Sharpe.

Solicitors—John McSweyn, Mr. Steers.

Auditors—Thos. Connolly, A. Campbell.

Council—Rev. Father Laurent, Rev. Mr. Marsh, Rev. Mr. Manning, Rev. Mr. McMillan, Rev. Mr. McFarlane, Rev. Mr. Hughson; Mr. Elias Bowes, Mr. W. M. Robson, Mr. E. W. McGaffey, Mr. Robt. Ross; Mrs. Keenan, Mrs. Trew, Mrs. Whiteside, Mrs. Kylie, Mrs. Geo. McHugh, Mrs. Sharpe, Mrs. Arnott, Mrs. Goodwin.

DUNNVILLE.

The Children's Aid Society of Dunnville district was organized during 1896, but the formal recognition by Order-in-Council was not issued until May 12th, 1897. During the year the Society has not been inactive. One family of six children were left homeless by the death of their parents and the Society did material service in finding homes for them. Two of the children were sent to relatives, while the other members of the family are in homes in the district.

The Officers are as Follows:

President—Wm. Shinton.
1st Vice-President—S. W. Brown.
2nd Vice-President—W. D. Swayze.
Secretary-Treasurer—R. A. Harrison.
Agent—Wm. R. McIndoe.
Hon. Solicitor—Robt. Bradford.

COLBORNE.

The annual meeting of the Children's Aid Society of Colborne, Cramahe and Haldimand, was held in Colborne on Tuesday evening, July 6th, last. The report submitted stated that ten complaints of neglect or ill-treatment had been received and attended to. In the case of two of these a transference of guardianship was effected and the children placed in foster-homes through the agency of the Provincial office. In the case of three others judicial investigations were held, as a result of which an incorrigible youth was sent to the Industrial School and a girl of thirteen years of age, guilty of a misdemeanour was sent to the Provincial Refuge. In the third case a girl of eleven was committed to the guardianship of the Society and placed in a foster-home by the Provincial Superintendent. Since the annual meeting six children have been placed in foster-homes, and one or two changes made in the homes of those formerly placed. Steps have been taken to bring about a better observance of the Act regarding the sale of cigarettes, tobacco and liquor to minors, and repeated warnings have been sent to the dealers in such articles. Special meetings were held at Castleton and Eden, at which the objects of the Society were explained.

The Following are the Officers:

President—Rev. G. H. Webb.
1st Vice-President—Jas. McGlennon.
2nd Vice-President—Mrs. I. Deans.
Hon. Solicitor—W. L. Payne.
Sec.-Treas.—H. J. Foik.
Agent—W. H. Smith.
Board of Management—Rev. Mr. Duncan, Rev. Mr. Watson, Rev. Mr. Jolliffe, and Messrs. Fitzgerald, W. H. Ives, Dr. Willoughby, H. Gale, V. G. Cornell, Thos. Brown, and Mesdames Webb, Payne, Jolliffe, Duncan, R. J. Rutherford and E. Gould.

PARIS.

During the past year the Children's Aid Society of Paris lost their President, Mr. James Cran, through his removal to another city. Mr. Cran has taken a deep interest in all benevolent and philanthropic work, and his removal to another sphere was greatly regretted. Mrs. E. A.

Wheeler, who has been actively connected with the Society since its inception, was elected President; Mr. Thomas O'Neail, Vice-President; Mr. David Brown, Treasurer, and Mr Lewis Maus, Secretary. Few cases have occupied the attention of the Society, but some preventive work has been done, while Mrs. Wheeler has given valuable assistance in finding homes for children, and also in visiting those already placed out.

UXBRIDGE.

The Children's Aid branch at Uxbridge, although occupying a very limited sphere, has not been idle during the past year. The guardianship of three children was received from a Magistrate's Court, and they were transferred to this office to be provided with homes. One case was that of a girl whose mother was dead and whose relatives did not treat her kindly, with the result that she was drifting about in a very unsatisfactory way. In another case a brother and sister were constantly sent begging, and were growing up without training or discipline of any kind; A number of warnings having failed to bring about an improvement, the children were taken away and are now doing fairly well amid other surroundings. The influence of the Society is for good, since the mere presence of the organization has frightened away from the district two disreputable families who feared that action would be taken against them. The resolutions and discussions at the meetings have been helpful to the moral welfare of the town, and the President writes, "If all the Children's Aid Societies were thoroughly active, our country would seen be purified from most of the present domestic evils, and happy homes and respectable, well-trained children would be the result."

The Officers are as follows.

President.—T. C. Nicholls.
Vice-President.—D. Baird.
Secretary.—Harmon A. Crosby.
Agent.—James Anderson.

COBOURG.

The Children's Aid Society of Cobourg does not report any extensive work carried on during the year, but probably the conditions were such that comparatively few children required attention in their district. One pleasing feature about this Society is that the treasury has never been empty since the Society was organized, there being at present about sixty dollars.

Two small children, a brother and sister, were deserted in Cobourg by the father who went off to the old country and wrote that he could not afford to maintain them any longer. As there were no other relatives the Society obtained the guardianship and the children were placed in foster homes.

The Officers of the Society are as follows.

President.—R. Wilson.
Vice-Presidents.—Mrs. H. F. Holland and G. Waters. Esq., M. D.
Secretary and Treasurer.—Jno. W. Bickle.
Agent.—William Rankin.
Honorary Counsel.—J. H. Dumble.
Members of Council.—Mrs. W. Hopper, Mrs. R. Wilson, Mrs. N. F. Macnachtan, Mrs. W. Doheny, Mrs. D. McNaughton, Rev. Canon Spragge, Rev. J. Hay, Rev. W. J. Jolliffe, Rev. E. H Murray, Rev. S. T. Bartlett, Mr. Chas. Lawes.

BROCKVILLE.

The Children's Aid work in Brockville has been practically a dead letter for the last two years, but I am glad to be able to report that there is a prospect of greater activity in the future. While some of the good people in Brockville thought there were no children requiring the action of the Society, the Chief Constable held a very different opinion, and the County Judge was compelled to send two children to the Industrial Schools, while a third from the same family was sent to the Mercer Reformatory, to get them away from bad home surroundings. I visited Brockville in November, and met a number of the friends of the work who arranged to reorganize the Society and make another effort to carry out the intentions of the Children's Act. I have since received a letter from Chief Rose describing two or three cases indicative of the need for such an organization, and have undertaken to help provide for a family of children just rescued from degradation, who are about as low in the human scale as any that have ever come to my notice.

The President is Ald. F. G. McCready, while Chief Constable Rose has been appointed Agent.

COLLINGWOOD.

During the year a visit was paid to Collingwood by the Rev. James Lediard, of Owen Sound, who addressed a public meeting explaining the methods of organization under the Children's Protection Act. It was found that quite a number of prominent citizens were interested in the movement and willing to do anything in their power for neglected or homeless children. A committee was formed and a start made towards organization. Several children who were found in very neglected surroundings, were taken over and sent to Mr. Lediard, who placed them with very little delay in good homes.

The officers of the Collingwood branch are:

President.—W. A. Grieves.

1st Vice-President.—Mrs. Buck.

2nd Vice-President.—Mrs. McCraney.

Secretary-Treasurer.—E. Ward

It is likely that a public meeting will be held shortly to complete the organization of the Children's Aid Society.

REV. C. W. WATCH, BRIGHTON.

The work carried on by Rev. C. W. Watch, of Brighton, has greatly increased during the year, and many children have been placed in good homes through this agency. This is exclusively a home-finding organization and only such children are received as are legally transferred by the nearest relatives or guardians. Although carried on as an independent Christian mission, this work is in harmony with the Children's Protection Act, and children placed in foster homes by Mr. Watch are reported to this office and recorded in the same way as wards of the various Children's Aid Societies. They are also visited by Mrs. Harvie and reports made to me concerning the homes and the progress of the children. The chief difficulty encountered has been the financial one as the work has grown beyond the limited means derived from voluntary contributions. The extent and usefulness of this work will be better understood by a reference to the accompanying report which I have received:

"We have recently had many evidences of success and blessing, one thing which greatly encourages us is the fact that nearly all our very young children remain in their first homes and

become in reality a part of the family adopting them. The return cases are chiefly among the children received by us after they are ten or twelve years of age, and the sixteen mentioned as return cases include the children of previous years. That only sixteen children were returned in a year out of 100 living in foster homes is not a bad showing, and of these only two or three at most can be said to be causing us any anxiety.

We are in receipt of most encouraging letters from both foster parents and children. We are more than ever convinced by the experience we have that this method for rescuing and training our needy children is the best for both the country and the child.

Our great want just now is money, it being a voluntary undertaking no special appeals are made for funds, and we have to regret that we cannot always do all that should be done for the litt'e ones. We are not discouraged. We still believe that when the work is rightly understood there are many more Christian people in Canada who will cheerfully help us.

We have to thank our faithful co-workers, and they are many, though not one is in receipt of any salary or remuneration. To our officers, the Methodist deaconesses of Toronto, and the earnest ladies of Brighton and Toronto we express our gratitude for their labor of love.

We are finding there is no lack of good homes for children. We suffer more from the want of children and funds. We would appreciate this if it were an indication that there were no more need of children to be helped, but unfortunately this is not the case.

Statistics.—The following are the statistics for the eleven months, from January 1st to November 30th, 1897 :

Number of children in Shelter January 1st, 6 ; number of children received during the eleven months, by transfer of guardianship, 20 ; from Children's Aid Societies, 16 ; from Provincial Department, 13 ; from friends of children, 4 ; total, 66.

Number of children returned from foster homes, including children placed previous to the eleven months, returned from first home, 14 ; returned from more than one, 2 ; total children returned, 16.

Number of children who have died during the eleven months, in foster homes, 1 ; in Shelter, 3 ; total deaths, 4.

Number of children who left Shelter without consent, 2 ; number of children who left foster homes without consent, 2 ; total runaway cases, 4.

Number of children placed out during the eleven months, placed for first time in foster homes, 58 ; number placed more than once, in addition to the above, 16.

Number of children actually placed in homes, including replacements, 74.

Number of children still in Sh lter, 4.

Number of children placed by Province—Placed in homes in Ontario, 49 ; placed in homes in Quebec, 4 ; placed in homes in Maritime Provinces, 2 ; placed in homes in Manitoba and North-West Territories, 19 ; total, 74.

Number of homes visited during this period by our voluntary workers, independent of visits by Provincial visitor, 49.

Number of applications received during this period, 191.

Average cost per child to the time of placing it in its first home, $22.35.

Average age of the sixty children received, 6 years and 8 months.

OFFICERS.

Superintendent.—Rev. C. W. Watch.

Hon. Physician.—F. B. H. Dean, Esq., M.D.

Hon. Solicitor.—J. W. Gordon, Esq.

Auditors.—R. Hewitt, Esq., C. B. Kemp, Esq.

BERLIN.

Not long ago I visited Berlin and addressed a meeting in the Y.M.C.A. Hall in the interests of this work. While the Society, as an organization, has not perhaps been as active as in some of the other towns, a great deal of good work has been done by the Secretary, Mr. F. Colquhoun. I would like to see a more general interest taken in the Society's work by the people at large,

for it is manifestly unfair that the burden should be laid upon the shoulders of one. In Berlin an orphanage was started about the same time as the Society, and the fact that any child actually destitute can be taken there, has perhaps led citizens to believe that a Society was unnecessary. But with the two organizations working in harmony, as I was glad to notice they are willing to do, a splendid work may be possible, and much neglect of children prevented by a little timely action on the part of the Society.

BRANTFORD.

The work of the Children's Aid Society of Brantf rd has been well sustained during the year. The Secretary, Mr. S. M. Thomson, writes as follows :—There are fewer cases of neglect and illtreatment to report for the year. The Society is satisfied that the vigorous manner in which they took hold of such cases had a beneficial effect upon offenders of this class. The Society was obliged to withdraw their regular standing advertisements in the daily press, there were so many applications for children that the supply was quite inadequate to the demand. Every child in care of the Society has been placed in a foster home, and in nearly every instance nothing but good can be said of such homes. It has been found necessary, however, in one or two instances, where the larger children were adopted, to change them from one home to another but in no case have we yet had to interfere where the children were adopted in infancy or tender years. We hear frequent reports from them and the Secretary keeps in touch with all so that he knows how they are getting along all the time. Some of the ladies connected with the Society are very active in calling at homes where it is thought a visit from them would be helpful in aiding the work aimed at, viz., that of making the surroundings of children better. The Police Magistrate, the Chief of Police and his staff of men are still helpful and willing to aid the work carried on. We have at the present writing only one child in our shelter for whom we are responsible, this is a boy of eleven years who came to Brantford from a neighbouring town leading a blind man from door to door, the man got the worse of liquor and was locked up for the night and on the morning when the boy's story was told the Magistrate would not allow him to go with the blind man but gave him instead into the care of the Society. During the year two brothers who had been adopted by neighbouring farmers had been visited by their father who had given them up years before, his visit made them discontented and they ran away together and so far have not been heard of. We find the Shelter an excellent adjunct to our work and have nothing but good words to say of the way it is conducted by Miss Robertson, the lady in charge.

OTHER SOCIETIES.

In Barrie the Children's Aid Society found homes for four children recently, but unfortunately the homes were not as suitable in three of these cases as they might have been. While we desire foster homes to be found for dependent children, still, it is most essential that care should be exercised in the selection of them, as otherwise the work may fall into disrepute. Two of these children have since been removed, and a third will probably be changed in the near future. A branch Socieiy was organized in Gananoque some years ago, but owing to the limited field it was found impossible to sustain interest in the movement, so that latterly any cases of child neglect have been attended to through the co-operation of the Kingston Society. The Society at Goderich has been organized with county jurisdiction, and the work is in a formative state with good prospects of future usefulness. The Children's Aid movement in St. Thomas does not appear to prosper. Mr. K. W. McKay writes that no meetings of the Society have been held during the year ; that a few matters brougt to the attention of the President were investigated, but no action had been taken. I hope, however, that the coming year will see an improvement.

INDUSTRIAL SCHOOLS.

There are three certified Industrial Schools in Ontario with a total population of 168 pupils, their special work being the training and reclamation of wayward children between the ages of ten and fourteen. Originally established as Toronto institutions, these schools have gradually become provincial in their character with the result that various anomalies have arisen. Of the 168 pupils above mentioned, about 80 have been committed from outside municipalities, and these children are being educated very largely at the expense of Toronto. This has been complained of on several occasions and there is no doubt but that a grievance exists. These schools seem to be in a transition state, and it will be necessary in the near future to consider some equitable plan of adjustment. It is worthy of note that notwithstanding the establishment of a third school during the past two years, the cost to the country for maintenance has been reduced over $5,000 per annum owing to the decrease in the number of commitments.

While there has been a good deal of objection expressed by municipalities to the compulsory payment of $2 per week for youths sent to the Industrial Schools, this method of assessment has its advantages. One important advantage is that it prevents the careless and indiscriminate commitment of children who could be provided for by simpler and better methods. In the United States, where the whole expense of these schools is defrayed by the Government, children are committed on the slightest provocation, with the result that an undue burden is placed upon the tax-payers. In Michigan, for instance, the State Industrial School for boys has over five hundred inmates, while in Pennsylvania the State reform school has nearly seven hundred All the reform schools of Ontario contain less pupils than are to be found in one school across the line. The economy, as well as the wise policy of this, ought to be apparent to every ratepayer in Ontario.

Victoria Industrial School.

I have visited this School and examined the commitment papers of the pupils in accordance with the terms of the Act under which aid is granted by the Province. The number of residents is slightly greater than at the same period last year, there being 120 names on the roll. There is, however, a considerable decrease over some years past, when the number of pupils was from 200 to 220. The School was originally over built as there is accommodation for seventy-five more than are in attendance. The boys seemed to be fairly contented with their surroundings, and to be making reasonable progress in their studies. One of the greatest drawbacks in connection with this School is the lack of sufficient funds to provide all the facilities that could be desired in the development of the work and the successful training of the pupils. There is no endowment of any kind and all the funds received depend upon the number of pupils. The decrease in committals has meant a loss of several thousand dollars per annum, and this has made it exceedingly difficult to provide for manual training. A short time ago the School was visited

by a Grand Jury who made an adverse report. This report was hardly fair to the School management. The Superintendent, Mr. C. Ferrier, is evidently anxious to do the best he can for the boys under his care, and has expressed a willingness to co-operate in the movement for speedily placing in homes such lads as do not need a prolonged discipline. The detention of children for a number of years has in the past been very unpopular with municipalities who were called upon to pay the maintenance, and if they can be assured that no child will be detained a day longer than is absolutely essential to his own best welfare, then there is no reason why the School should not be given its due place in the system of child reclamation. Such a School as this could not be dispensed with, since there will always be incorrigible and delinquent children, but if child saving work is properly conducted in Ontario it ought not to be necessary to have any institution containing more than 100 children at any one time.

I found on examination of the vouchers, etc., that the school was entitled to a grant for the year's work of $4,207.60. This is at the rate of ten cents per day for each boy's actual residence, the municipalities being required to make a further grant of two dollars per week toward maintenance. The amount of the Government grant this year is smaller than ever before. The following table shows the amounts paid by the province to this school in recent years :

1893	$6,596 30
1894	7,147 90
1895	6,780 70
1896	5,267 27
1897	4,207 60

As there has been a corresponding decrease, only on a larger scale, in the amounts paid by the municipalities, it will be seen that the school revenue has been very materially reduced, and that careful financing is necessary to enable the work to be continued.

St. John's School.

There are twenty-eight boys in St. John's School, East Toronto, and they appear to be making good progress in their studies, etc. This school received when it opened about two years ago, fifteen boys from the Industrial School at Mimico. Several of these lads have since been discharged or paroled and the school now receives any boy under fourteen belonging to the Roman Catholic Church whom it is found necessary to subject to industrial school training. The school is under the direction of Rev. F. Rohleder, and the practical work is carried on by three Christian Brothers, a shoemaker, carpenter, cook, laundress and caretaker.

The amount of the Government grant, at the rate of ten cents per day for each pupil, was $579.90 for 1896, while the grant for the past year, 1897, amounted to $876.40.

Alexandra School for Girls.

The Alexandra Industrial School for Girls at East Toronto is carried on as a branch of the Victoria Industrial School Association, which also directs the work of the Victoria Industrial School at Mimico. There are twenty girls in residence, and while I believe that the management and training is careful and painstaking, still the girls who have passed through the school do not appear to turn out well as a whole. Several girls who were committed to the school nearly six years ago are back and forward, apparently unable to keep a situation longer than a few weeks at a time. The reason for this condition of things may be found in the lack of mental capacity which so often characterizes the children who are sent to institutions. The superintendent, Miss Walker, is thoroughly devoted to her work and does not spare any effort that is calculated to benefit the girls under her charge. She has, until quite recently, carried on the work with one assistant, but has now two, in addition to the caretaker and his wife. The closest economy appears to be exercised in the management of the institution. The grant for 1896, on the per capita basis of ten cents per day, amounted to $757.80, while in the past year, 1897, the amount was $622.50.

NOTES ON CHILD SAVING

GATHERED FROM MANY SOURCES.

If nobody loves you be sure that it is your own fault.

Pauperism results in proportion to the amount of relief given.

A bureau of registration is an important adjunct to every charity undertaking to relieve the necessities of the poor.

Under a proper system of relief-giving imposters are driven out, because their history can easily be ascertained.

The impression prevails that relief must be given by the Associated Charities. This is a mistake. What we need is individual effort, sympathy, and encouragement, so that self-respect may be retained, or, if lost, restored

There are four causes of pauperism,—liquor, foul homes, indiscriminate almsgiving, and neglect of child-life.

Dean Gilman, of Johns Hopkins University, says that the six great evils that we have to combat are, intemperance, ignorance, vice, crime, disease, and pauperism.

The growth of pauperism and crime can be more easily, certainly and economically checked by the care of dependent children than by any other means.

Every day that the education of neglected children is put off, the bad elements of society are becoming more powerful, owing to surrounding influences and the steady growth of pernicious habits.

Governments have been obliged to erect reformatories and prisons at vast expense, to reform or restrain those whom a wise, careful education, if taken at an early age, would have made worthy members of society.

The greatest achievement attainable by whoever undertakes the training of youth is so to check evil propensities, and stimulate the growth of good ones, as to enable the individual worthily to fulfil the ends for which he was created.

The problem of permanently raising the children of pauperism and vagabondage will never be satisfactorily solved until philanthropic effort is so interwoven as to secure a close cooperation—until the little child, once got hold of, has been tended till he reaches manhood, and is seen to settle down to an honest occupation.

There is one point respecting moral training which should never be lost sight of by those who have the care of the young, namely: the fact that in order to make it effective there must be a certain amount of freedom of action allowed to the child.

Who would not give a little to prevent that which he would give a thousand worlds to cure!

If a child is not properly trained and cared for it will seldom fail to become a disturbing element in society, for idleness and vagrancy soon produce criminals. Society and the State has the deepest interest in the proper education of those who are soon to be active participants in the affairs of each; if intelligence is necessary to a proper handling of our government by and for the people, then the education of the future voter, whether the child of wealth or poverty, is absolutely necessary to the welfare of the State. Neither the fault nor the misfortunes of the parents should close the schools against their children, or deprive them of the benefits of moral and refining influences.

Dependence of Childhood.—There is no dependence so absolute; there is nothing to which it may be likened. A little child on a precipice, with yawning, interminable depths beneath; forces accumulating against it; adverse influences surrounding it; no hand to guide; no arms to protect; no heart-clasp to hold it; nothing but imminent danger, may faintly outline the picture, whose lights and shades no human pencil can portray. Such conditions of life can be fully understood only by Him who, from the manger to the cross, had not where to lay His head.

Neglected and dependent children are often sentenced to reform schools on flimsy pretexts, and sent, many during their minority, to associate with hardened youths, with nothing to do but to scrub floors and educate themselves in crime by association with criminal boys, who, of course will each impart to the others his peculiar devices and methods of crime.

We have a habit in this country of pointing with pride to our large, clean asylums, houses of refuge and prisons, in contrast with those of a former age; but the elimination of all reformatories, houses of refuge, asylums, soup-houses and alms-houses, and the establishment of dependents and delinquents in homes, so that there will be no neglected children destitute of home influences; intelligent methods of education and loving hearts, will soon, and has already, through these temporary shelters, announced the arrival of a grander, nobler age of reason and true philanthropy.

It is, I think, almost universally admitted that the most successful work for children or indeed in any branch of philanthropic effort, is that which is inspired by religious conviction. It is with this thought in view that I print here a battle hymn for all who are trying to help the poor and unfortunate up to a higher plane of living. These words were printed in one of the reports of the Refuge and Reformatory Union of Great Britain:

Lord speak to me, that I may speak
In living echoes of Thy tone:
As Thou hast sought, so let me seek
Thy erring children lost and lone.

O lead me, Lord, that I may lead
The wandering and the wavering feet:
O feed me, Lord, that I may feed
Thy hungering ones with manna sweet.

O strengthen me, that while I stand
Firm on the Rock, and strong in Thee,
I may stretch out a loving hand,
To wrestlers with the troubled sea.

O teach me, Lord, that I may teach
The precious things Thou dost impart:
And wing my words, that they may reach
The hidden depths of many a heart.

O give Thine own sweet rest to me,
That I may speak with soothing power
A word in season, as from Thee,
To weary ones in needful hour.

O fill me with Thy fulness, Lord,
Until my very heart o'erflow
In kindling thought and glowing word,
Thy love to tell, Thy praise to show.

O use me, Lord, use even me,
Just as Thou wilt, and when and where
Until Thy blessed face I see,
Thy rest, Thy joy, Thy glory share.

—*F. R. Havergal.*

The normal conditions of family life are necessary to the formation in the child of well-balanced, orderly, moral character. The sooner the children can be taken from institutions and placed in family homes, so much sooner is the community assured of their ultimate well-doing.

The formation of character commences while the child is very young. Hence, the less delay in bringing them into contact with those who will have the future direction of their lives, the better will their hearts be opened, expanded and warmed by the sweet sunshine and healthy influences of home life. Then, how many childless homes will be brightened and blessed by both the grateful love received from the children, and the care bestowed upon them? Many a load of sorrow over the loss of children can be sanctified and lessened by taking in and caring for some of these God-given souls, for real happiness consists in bestowing our love and working and sacrificing for its object.

Guilty—if we neglect our opportunity to pluck that bright jewel of human intelligence, the homeless child, from evil surroundings and put him in the way of becoming a useful member of society instead of allowing him to sink deeper and deeper into the mire of illiteracy, pauperism and crime.

"Will grows by use, as muscles grow stronger by effort. Every struggle made toward purification, toward the union of the higher and lower self, not only increases the will, but severs the cords that bind the soul to the world of sense. Every cord severed sends added will in an opposite direction, and freedom is the result. We may not be able to escape the destiny that belongs to us, but we can choose the path in which we shall travel to meet it."

"We know that as long as the world lasts there will be people of every class. There will always be drunkards and thieves—bad fathers, bad mothers. All we can do is to try in different ways to stem the tide of evil. There are numbers of fathers and mothers in the world who are quite careless and indifferent to their children's welfare, and the consequence is that thousands of poor children are utterly neglected, or the example set them has been so bad that they have grown up familiar with every crime. I believe that the welfare of our country depends very much upon our training up these children so that they may lead different lives to what their parents have led. I have no doubt there are amongst us many shades of opinion and many varieties of religious thought, but I hope we are all agreed upon one thing, that religious training should be the foundation of all work among the young. Although there may be difference of opinion as to the manner in which that work should be brought to bear, yet I think that we all feel that religion should stand first and foremost."

Michael Angelo was walking in one of the purlieus of Florence in holiday dress and costume. All at once he went down on his knees to a dirty block of stone, and commenced scraping it with great earnestness. His friend asked him what he was about. He replied, "I know what I am about. I see an angel in that stone." The block was of pure white marble. It was removed to his studio, and after months of patient work with mallet and chisel, the angel came forth —A beautiful simile for us: A good many of these boys and girls, with patience and endurance, prayer and perseverance, may prove angels, and growing up in the world as good and happy Christians, as such, may do angel's work.

"Managers and officers of orphan asylums sometimes claim that though the early placing-out of children is sound enough in theory it does not work well in practice. They say they have entrusted some of their boys to families to be loved, protected and educated, but the results were disappointing. The boys were not sent to school; they worked hard on the farm from early morning till evening and received no pay; they were not made members of the family in any real sense. To such objections it might be asked: How careful were you in selecting the families with whom you placed the children? Did you think it worth while to send some experienced agent to visit each home and find out all about its surroundings before you placed a child in it? Did you make enquiry of the neighbors as to the moral character of the people? And after you had placed a child in the home, did you send some person to visit the child to gain positive knowledge as to his treatment, the kind of clothing he was wearing, the kind of work he was doing, what his relations to the family were, who were his associates, and whether he was attending school? And did you instruct this visitor to remove the child if his best interests demanded it? If you did not do these things how could you expect that your children would fare well?"

In Ontario there is a growing conviction that a boy brought up on a farm is in the long run infinitely better off than a lad brought up in an institution. He learns the true importance of

work and if he has any sterling qualities about him there is no reason why he should not be able to advance himself materially. Writing in *The Westminster* for November, 1897, on the growth of national sentiment in Canada, Principal Grant says: "The greater the difficulties the greater our gain in overcoming them. As with an infant so with a nation. Strength comes from conflict, from the enduring of hardness, from resisting temptations. As with moral, so with intellectual development. When lessons are made easy for the scholar, when teacher or professor does his thinking for him, shallow brains are apt to talk of the boy's great advantages and to expect great results from the wonderful system under which he is being trained. Wonderful, indeed, that even shallow brains should make such a mistake! The poor boy is really being victimized by what the traditional Irishman called 'cruel kindness.' If he ever becomes a strong man, it is only because his native stuff was too good to be made utterly flabby."

"Children are born pure, and could they be kept so, a single generation would sweep crime out of existence. While this is an impossibility, at least so long as man remains a sinful creature, it suggests the only rational method for preventing or radically diminishing crime and criminals. Subject to some exceptions, lamentably few in number, criminals must be reformed before they become criminals. In other words, we must begin with children, and prevent them developing criminal dispositions."

"Innocence is the prerogative of childhood"; "Of such is the Kingdom of Heaven,"—and he or she who labors to preserve it in its purity is engaged in the noblest service that man can render his fellows or his God.

The Earl of Shaftesbury, a wide and accurate observer, reached the following conclusion: "Of all the adult male criminals in London, not two in a hundred have entered upon a course of crime who have lived an honest life up to the age of twenty. Almost all who enter upon courses of crime do so between the ages of eight and sixteen."

"Idleness is a great promoter of crime and criminals, and industry one of the best correctives of evil habits."

An experienced and widely-known detective, Matt W. Pinkerton, of the United States Detective Agency, writing on "The Economical Treatment of Criminals," says: "It is my opinion, based upon personal observations and acquaintance with a large number of criminals who have served time in prisons and reformatories, that, owing to the lack of intelligent classification, very few criminals are really reformed under our present system, while many who enter our prisons and reform schools only slightly corrupted, leave them thoroughly debased, hating society and the law, and bent on emulating the hardened examples with which they have come in contact. The streets and alleys of a great city are bad places in which to raise a boy who is naturally wayward, but they are Sunday schools in comparison to the wards of a reform school where all grades of depravity, from the plain thief to the sexual pervert and born criminal are indiscriminately mingled together."

"To listen to the applause, the celestial joy, which greets the safe arrival in the court of heaven of one repentant sinner, to whose return to the paths of rectitude we have contributed, will surely thrill us with happiness unknown on earth. But to have been instrumental in preventing the ninety and nine from going astray—what of that? To have saved our fellows from pain, suffering, crime; to have made their earthly lives instruments of good instead of evil—can the manifold rewards of heaven contain a bliss superior to such a consciousness?

"Around us are thousands of boys and girls who have never heard a mother's prayers or a father's admonitions, or having heard, have forgotten them. Let us seek them out before our advice and assistance will prove unavailing; while they can yet be diverted from their downward course. Let us seek them out before they are too far advanced upon those broad roads, deception, waywardness, dissipation and theft—all of which, with many others, converge in that one terminal point, destruction."

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TWENTY-THIRD ANNUAL REPORT

OF THE

ONTARIO AGRICULTURAL COLLEGE

AND

EXPERIMENTAL FARM.

1897.

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TWENTY-THIRD ANNUAL REPORT

OF THE

ONTARIO AGRICULTURAL COLLEGE

AND EXPERIMENTAL FARM,

FOR THE YEAR 1897.

GUELPH, January 1st, 1898.

To the Honorable JOHN DRYDEN,
Minister of Agriculture:

SIR,—I have the honor to transmit herewith the Twenty-third Annual Report of the Ontario Agricultural College and Experimental Farm.

In this report, the work of the year 1897 has been briefly reviewed under the following heads:

PART I. REPORT OF PRESIDENT.
PART II. REPORT OF LECTURER IN ENGLISH AND PHYSICS.
PART III. REPORT OF PROFESSOR OF BIOLOGY AND GEOLOGY.
PART IV. REPORT OF PROFESSOR OF CHEMISTRY.
PART V. REPORT OF PROFESSOR OF VETERINARY SCIENCE.
PART VI. REPORT OF PROFESSOR OF DAIRYING.
PART VII. REPORT OF AGRICULTURIST.
PART VIII. REPORT OF HORTICULTURIST.
PART IX. REPORT OF BACTERIOLOGIST.
PART X. REPORT OF EXPERIMENTALIST.
PART XI. REPORT OF FARM SUPERINTENDENT.
PART XII. REPORT OF MANAGER OF POULTRY DEPARTMENT.
PART XIII. REPORT OF APICULTURIST.
PART XIV. REPORT OF PHYSICIAN.

I have the honor to be, Sir,
Your obedient servant,

JAMES MILLS,
President.

THE ONTARIO AGRICULTURAL COLLEGE

AND

EXPERIMENTAL FARM, GUELPH, ONT.

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NINETEENTH ANNUAL REPORT OF THE ONTARIO AGRICULTURAL AND EXPERIMENTAL UNION.

(*Printed as a Separate Report.*)

MAIN BUILDING—ONTARIO AGRICULTURAL COLLEGE, GUELPH.

PART I.

REPORT OF THE PRESIDENT.

The steady progress of a nation in times of peace and prosperity is not so clearly marked from year to year as is the condition of things when there is domestic disturbance or foreign complications. It is so with an institution; and the Ontario Agricultural College is no exception to the rule. For some time past its history has been characterized by uninterrupted peace and prosperity, and for that very reason its condition has not been so definitely and adequately set forth as in the earlier days. For the last four years especially it has moved steadily forward without a solitary jar of disturbance or agitation; in fact the machinery has worked so smoothly, quietly and effectively, that people have scarcely been aware of its movement. It is, of course, true that we are well watched now as at other times; we are severely criticized once a year; and we are often misrepresented; but these things do not seem to influence the body politic very much so long as the officers of the College are united among themselves, mind their own business, and keep pushing ahead.

The past year has been one of honest work, perfect harmony, and satisfactory progress throughout the departments of the institution, separately and in their relation to one another; and, in justice to the officers under me, it may be said that they are earnestly endeavoring to educate thoroughly the young men who come to the College, and as zealously striving to serve in every way possible the farmers of the Province at large.

Some who have gone forth from our halls, like a considerable number of "old boys" from other schools and colleges, are not doing so well as they should; but the great majority of those who have been with us long enough to get a fairly thorough knowledge of our course of study and apprenticeship, are giving a good account of themselves at home and abroad. They have gone back to work with an increased liking for farm life; they are pushing to the front as practical, progressive men; and, wherever you find them, they are warm friends of the College at Guelph. Of the students now in attendance, over ninety-five per cent. came on the express recommendation of ex students.

Students in Attendance.

The attendance of students during the fall term of the year just closed—1st October to 22nd December—was 27 more than during any previous term since the College was opened, 23½ years ago. At the present time every bed in the Residence is occupied and 27 students are lodging outside, most of them in the immediate neighborhood of the College. The total number on the roll in 1897 was 275—212 in the regular course, and 63 in the special dairy course, the great majority being Ontario farmers' sons of the very best class.

County Students.

By Act of Parliament, each county council in the Province has power to send one student free of tuition. Of those on the roll in 1897, 60 were nominated by county councils, and as a consequence were exempted from the payment of tuition fees. The counties which exercised the power of nomination last year (42 in number) were the following: Algoma, Brant, Bruce, Carleton, Dufferin, Dundas, Durham, Elgin, Essex, Frontenac, Glengarry, Grenville, Grey, Haldimand, Halton, Hastings, Huron, Kent, Lambton, Leeds, Lennox, Lincoln, Middlesex, Norfolk, Northumberland, Ontario, Oxford, Parry Sound, Peterboro', Peel, Perth, Prescott, Prince Edward, Renfrew, Simcoe, Stormont, Victoria, Waterloo, Welland, Wellington, Wentworth, and York.

Analysis of College Roll.

1. *General Course.*

(1) From Ontario.

Counties, etc.	Students.	Counties, etc.	Students.
Algoma	2	Middlesex	7
Brant	6	Norfolk	3
Bruce	3	Northumberland	7
Carleton	2	Ontario	5
Dufferin	1	Oxford	3
Dundas	1	Parry Sound	4
Durham	3	Peel	2
Elgin	2	Perth	4
Essex	2	Peterborough	2
Frontenac	4	Prescott	3
Glengarry	3	Prince Edward	2
Grenville	2	Renfrew	1
Grey	6	Russell	4
Haldimand	2	Simcoe	8
Halton	1	Stormont	1
Hastings	4	Victoria	5
Huron	5	Waterloo	4
Kent	2	Welland	3
Lambton	4	Wellington	12
Lanark	2	Wentworth	6
Leeds	6	York	6
Lennox	2	Toronto	15
Lincoln	5		
Manitoulin Island	2		179

(2) From Other Provinces of the Dominion.

Provinces.	Students.	Provinces.	Students.
Manitoba	2	Prince Edward Island	2
North-West Territory	1	Quebec	8
Nova Scotia	3		16

(3) From Other Countries.

Countries.	Students.	Countries.	Students.
Bermuda	2	United States	1
England	12		17
Scotland	2		

Total in General Course 212

2. *Dairy Course.*

Counties, etc.	Students.	Counties, etc.	Students.
Bruce	2	Oxford	8
Carleton	1	Perth	3
Dufferin	1	Prince Edward	1
Durham	1	Russell	1
Dundas	2	Simcoe	1
Elgin	2	Stormont	1
Grey	2	Victoria	2
Grenville	7	Wellington	7
Huron	3	Wentworth	1
Leeds	3	England	1
Lincoln	2	Ireland	1
Middlesex	2	North-West Territory	1
Norfolk	1	United States	1
Northumberland	2		
Ontario	3		63

AGE OF STUDENTS IN GENERAL COURSE.

1	14 years of age.	20	23 years of age.
3	15 "	7	24 "
13	16 "	4	25 "
26	17 "	2	26 "
37	18 "	3	27 "
33	19 "	2	28 "
19	20 "	2	29 "
18	21 "	1	30 "
20	22 "	1	31 "

Average age of Students in General Course..... 20
" " Dairy " 23

RELIGIOUS DENOMINATIONS.

(1) Students in General Course.

Methodist	67	Brethren	3
Presbyterian	65	Congregationalists	2
Episcopalians	55	Christadelphian	1
Baptists	8	Unitarian	1
Roman Catholics	6		
Friends	4		212

(2) Students in Dairy Course.

Methodists	32	Baptists	4
Presbyterians	12	Catholics	4
Episcopalians	11		
			63

ENGLISH.

There is no subject in our course of study which receives more careful attention than English. The early education of many of our best students has been very much neglected; and it is only by the most persistent and painstaking drill in grammar, composition, and literature that we succeed in making such students fairly correct and proficient in the use of their mother tongue, without which they cannot hope to hold their own in the fierce struggle and intenseley keen competition of these times.

We continue the study of English from the beginning to the end of our course.

PHYSICS.

During the last few years, we have made a distinct advance in the subject of physics. The work done in this department—including mechanics, hydrostatics, hydrodynamics, thermodynamics, electricity, and agricultural physics—is much broader and more practical

than formerly. Owing to the enterprise and liberality of the Minister of Agriculture, we now have a separate physical laboratory, which is fairly well equipped for practical demonstration and instruction in the various branches under this head, especially in the study of soil moisture and the functions of the different constituents which enter into the composition of soil; and, with an able and energetic physicist, we hope before long to obtain valuable information regarding the physical characteristics of Canadian soils.

Biology.

Our work in biology, especially in zoology, is much more thorough and practical than it was a few years ago. A great deal more is required of students in this department than formerly. The whole field of botany, in all its branches, is now covered; and the laboratory practice in zoology has become an important part of the course prescribed for third year students. The work in biology is quite enough for one man. The United States agricultural colleges, almost without exception, have a man for biology and another for entomology; but hitherto we have had only one man for biology, entomology, and geology. Our Professor Panton, who is now very ill, has done the work for some time; but of late years the correspondence about noxious weeds and insects has been so large and has called for so much careful observation and research, that he has frequently complained of being unable to do justice to all that has been allotted to him: lectures in botany, zoology, entomology, and geology; laboratory work with students in botany and zoology; and an extensive correspondence on weeds and insects—work similar to that done by Dr. Fletcher of the Dominion Experimental Farms.

In consequence of the increased number of students and the extension of the practical work in botany, we found it necessary to enlarge our botanical laboratory, which we did last summer by putting a second storey on the boiler house attached to the building. By this alteration, we secured an additional room, 18 by 20 feet, for microscopic and seminary work.

Chemistry.

Early in May, our chemist, Prof. A. E. Shuttleworth, went to Gottingen, Germany, to do some work in organic chemistry, and to familiarize himself with the methods of investigation in the German agricultural Experiment Stations. In his absence, R. Harcourt, B S A., his assistant, delivered the lectures required in the department and took charge of the students in the qualitative and quantitative laboratories; and W. A. Kennedy, B.S.A., was employed to do Mr. Harcourt's analytic work in the laboratory.

Some valuable work was done in the laboratory during the year. A number of digestion experiments were made, to determine the feeding value of clover, timothy, and lucerne, cut at different stages of their growth; the analysis of ashes was continued from last year; and forty odd samples of sugar beets from the neighborhood of Owen Sound were analysed, to assist the people along the Georgian Bay in reaching a conclusion as to whether sugar can be profitably manufactured from beets grown in that locality.

Veterinary Science.

Nothing worthy of special notice has occurred in this department during the past year. Generally speaking, our stock has been healthy; and the work of instruction has gone on as usual.

Dairying.

Our Dairy School opened on the 14th January and continued in session till the end of March, a period of two and a half months. In 1898, the session will be three months —from the 4th January to the 31st March. Hitherto the attendance at the school has

been satisfactory; but it would, no doubt, have been larger if the session had been shorter. Young men are anxious to get certificates and diplomas in as short a time as possible, and are not disposed to spend ten to twelve weeks at Guelph if they can get certificates elsewhere in less than half the time.

From the close of the school to the end of the year—during nine months—two of our men are engaged in experimental work, Mr. T. C. Rogers in the home dairy and Mr. R. W. Stratton in the cheese room, both working under the head of the department and endeavoring to solve some of the many problems which confront those who are anxious to make first-class butter and cheese. Much valuable work along these lines has been done during the past year. Difficulties have been removed and obscure points made plain.

Agriculture.

Very few agricultural colleges have given as much prominence as the Ontario Agricultural College has given to the department of agriculture proper, including live stock. From the first, we have laid special emphasis on the work of this department, requiring all our students to take three lectures a week, with a large amount of practical work, throughout the first two years of the course, and specialists who choose the agricultural option to devote three or four hours a week to that subject in the third year. We have done so because we think the first duty of an agricultural college, and perhaps the chief one, is to make first-class practical farmers.

During the past year, the work of instruction and management in this department was done by two men. Mr. G. E. Day, our agriculturist, delivered the lectures on field agriculture and live stock, conducted the class-room drill in examining and judging cattle and sheep, did similar work with swine in the pens, looked after pedigrees and stock registers, and took charge of experiments in feeding cattle, sheep, and hogs. Mr. William Rennie, farm superintendent, devoted his time to the management of the farm and live stock, giving close attention to the minutest details and pushing the work ahead with as much zeal and persistency as if he were in charge of his own farm. I feel that I cannot speak too strongly in praise of Mr. Rennie's devotion to his work as Farm Superintendent; and I must not forget to state that, during the year, he has given the students a number of very valuable lectures on his methods of cultivating and preparing the soil for different crops. I am now warranted in saying that our farm is in good condition, well tilled and economically managed.

Horticulture.

The work in our horticultural department is extending from year to year. Mr. Hutt, our horticulturist, set out a large new orchard last spring, to test certain varieties of apples, pears, plums, and cherries in this cold and trying locality; and he continued his strawberry experiments on a very extensive scale. He has had 150 varieties under test, and has given the results in a concise and interesting form.

Bacteriology.

Of late years, a great deal of attention has been given to bacteriology. People are just beginning to realize how vast and important the subject is—important, because of the relation of bacteria to the growth of plants, the health of animals, and the food of man and beast. They abound in earth, air, and water, causing fermentation, putrefaction, and disease. A number of the worst species are found in sewers; and various disease-producing types are usually present in foul air and impure water.

As an outcome of this tuberculosis agitation, the Minister of Agriculture decided about a year ago to provide for the manufacture of tuberculin in our laboratory. The necessary apparatus was ordered at once, and our bacteriologist soon got things in shape

to commence work. The first fourteen doses were sent out about the end of May; and since that time the demand has increased so rapidly that we have found it necessary to order an additional incubator and add a room to the laboratory. With these additions, we hope to be able to supply what is required in the province.

Some original work has also been done during the year. A considerable amount of time has been devoted to foul brood in bees and to the bacteriological examination of milk, cheese, etc.

Field Experiments.

The work in this department is growing in importance from year to year. The experiments with varieties of wheat, oats, barley, peas, corn, turnips, mangels, potatoes, carrots, green fodders, grasses, clovers, mixtures of grain, etc., have been carried on systematically and persistently on well defined lines for seven or eight years, on plots in different parts of our fifty-acre field, and under climatic conditions which have varied with the years. Hence the results now begin to indicate very clearly which varieties are best adapted to the soil and climate of the College farm; and the co-operative experiments throughout the Province, carried on simultaneously by the College Experimental Union (largely under the direction of our experimentalist) go to show that the varieties which have done best at the College, give the best results all over the Province.

In this way some excellent foreign varieties have been introduced, tested, and distributed throughout the Province—varieties which yield from six to eight bushels per acre more than any varieties previously grown. *In oats and barley alone, the varieties introduced and distributed by our experiment station have, within the past four or five years, paid to the Province a good deal more than the entire cost of the College for the last ten years.*

Bird and Bee Departments.

We have a course of lectures, with suitable illustrations, by R. F. Holtermann, of Brantford, for first and second year students in the spring term. The most important practical points in bee-keeping are set forth and emphasized in these lectures; samples of hives, foundation, comb, etc., are exhibited; and some of the best breeds of bees are examined and studied while at work in a few hives which we keep for the purpose. The experimental work of this department is done by Mr. Holtermann in Brantford.

Further use has shown our poultry buildings to be satisfactory in their structure and arrangement; but the yard room allowed in our first plan has been found insufficient. Hence we have fenced in a considerable addition immediately behind the yards first enclosed. The more room fowl have for outside runs, the better.

The work in the poultry department has gone on as usual. The stock is in good condition and looks well. A fair number of chickens was raised during the year; but the results from our incubators were by no means satisfactory; and the regulation forbidding us to sell by private sale made the financial showing of the department much less satisfactory than it would have been. Persons wishing to select and prepare fancy birds for shows, will not wait and run their chance of getting them by auction. When buyers find what they want, they will pay a good price for it, if they can get it at once. If not, they will go elsewhere. We have had to refuse some excellent offers for birds which were afterwards sold at very low prices by auction.

Some experimental work was done in testing the keeping qualities of fertile and infertile eggs, and in crossing certain breeds and varieties of fowl.

Other Departments.

The usual routine of work throughout the year has been faithfully done by the College physician, the bursar, the instructor in drill and gymnastics, and the foremen in the different departments of the institution.

Water Works.

Our water works are now in very good shape. By a great deal of labor and at considerable expense, we have at length succeeded in getting all the water we require for the daily use of the different departments of the institution and for fire protection, with engine, supply pumps, fire pump, a reservoir 100x63x10 feet in front of the chemical laboratory, pipe connections, hose, reels, and ladders—all complete.

Other Permanent Improvements.

Several other additions to our permanent equipment have also been made during the year—a new sixty-foot brick chimney at the dairy department, to take the place of two iron smoke stacks which fell from the effects of rust and storm; a small house to protect the milking machine; a rope drive from the dairy engine to the dairy cattle barn, with shafting, etc, to drive the milking machine and cut feed for cattle in the dairy and experimental feeding stables: a cement floor in the dairy piggery; a six-foot close mesh wire fence around a large addition to the poultry yards; an 18x20 foot addition to the biological laboratory; the moving of a partition with the addition of a space 4x36 feet to our bacteriological laboratory, and expensive tables for the students' section thereof; iron staging about 3x180 feet and 8x60 feet, to take the place of decayed wooden staging in the tropical section of our greenhouses; and a cheap house to protect our fire hose, reels, etc., until a building suitable for the purpose can be erected.

Visitors.

We have been favored with a very large number of visitors during the past year—the usual quota from day to day, between 18,000 and 19,000 excursionists in the month of June, and the teachers and students of the Toronto Normal School in the latter part of September. These visitors, especially those who come on farmers' excursions, examine very closely our buildings, laboratories, apparatus, farm, garden, stock, etc.,; and the great majority, irrespective of political leanings, express themselves as well pleased with what they see.

Eastern and Western Dairy Schools.

These schools have done good work during the past year. The Eastern School being in a fine dairy section of the Province, and giving a good course of instruction, the attendance in 1896 was more than could be properly accommodated, especially in the milk testing and butter departments. Hence, in the summer of 1897, a contract was let for the enlargement of the building. The additions and alterations, which were completed about the first of October, furnished the necessary accommodation and left things in a good shape for the session commencing in November, 1897. As a result of these changes and other causes, the number of applications for admission to the courses of the present session is much larger than at any time in the past.

The Western School, at Strathroy, was run as a creamery during the summer, in order that both instructors and students might have experience of actual factory conditions and the difficulties which arise in handling large quantities of milk in warm weather. The results were, I believe, quite satisfactory to the patrons; but the attendance of students was not such as to indicate any general demand for dairy instruction in that part of the Province.

Class-Room Work.

The class-room work in the different departments has gone on as usual. Nine candidates wrote for the B. S. A. degree in the University of Toronto. Six received diplomas and one was starred in chemistry. A fair proportion of first and second year students gained a respectable standing in our College examinations; but the percentage of failures is still very large, resulting in some cases from idleness, but in most instances from a lack of proper training in the elementary branches of an English education.

Examiners.

The third year examinations were conducted, as usual, by examiners appointed by the Senate of the University; and those of the first and second years by the professors and instructors of the College, with the assistance of Wm. Tytler, B.A., Guelph, and Lyman C. Smith, B.A., Oshawa, Ont.

Bachelors of the Science of Agriculture.

The examinations for the degree of B.S.A. were held in the month of May, and the successful candidates received their degrees at the commencement exercises of the University in June. The list is as follows:

*Cass, L. H	L'Orignal, Prescott, Ont.
Gamble, W P	Cumberland, Russell, Ont.
Hodgetts, P. C	St. Catharines, Lincoln, Ont.
Macdonald, J. C	Lucknow, Huron, Ont.
Oastler, J. R	Featherston, Parry Sound District, Ont.
Parker, F. A	Bowmanville, Durham, Ont.
Rogers, C. H	Grafton, Northumberland, Ont.

*Starred in Chemistry of the general course.

Recipients of Associate Diplomas.

Twenty-four having completed our regular course of two years, were examined fof associate diplomas. Twenty-one passed in all the subjects and three were starred in certain branches. The diplomas were presented by the Hon. John Dryden, Minister or Agriculture, at the annual closing exercises on the 30th June. The names and addresses of the recipients are as follows:

Beam, E	Black Creek, Welland, Ont.
Clark, G. H	Cainsville, Brant, Ont.
Craig, R. D	O. A. C., Guelph, Ont.
Davis, A N	Cayuga, Haldimand, Ont.
Elliott, W. J	Seaforth, Huron, Ont.
Fairweather, F. H	Alma, Wellington, Ont.
Heartz, W. B. G	Spring Hill, Nova Scotia.
Lloyd-Jones, T	Burford, Brant, Ont.
Lucas, W. T	Bailieboro, Northumberland, Ont
Mooney, J. A	Inverness, Megantic Co., P. Q.
Morgan, G. W	Kerwood, Middlesex, Ont.
McCalla, G. B	St. Catharines, Lincoln, Ont.
McKinley, W. W	Seeley's Bay, Leeds, Ont.
*McMillan, M J	Newmarket, York, Ont.
Reade, J. M	Toronto, Ont.
Richardson, E. L	Toronto, Ont.
Robertson, T. H	Kingston, Frontenac, Ont.
Ross, H. R	Gilead, Hastings, Ont.
Ross, M. N	Warrington, England.
Ross, N. M	Warrington, England.
Squirrell, W. J	O. A. C., Guelph, Ont.
Summerby, W. L	Russell, Russell, Ont.
*West, A. W	Shelly Bay, Bermuda.
*Winchester, G	Toronto, Ont.

*To take supplemental examinations:—McMillan, in Literature; West in Literature and Electricity; Winchester in Literature.

First-Class Men.

The work of the College is divided into five departments; and all candidates who get an aggregate of seventy-five per cent. of the marks allotted to the subjects in any department, are ranked as first-class men in that department. The following list contains the names of those who gained a first-class rank in the different departments at the examinations in 1897, arranged alphabetically:

First Year.

1. *Anderson, J. B.*, St. Marys, Ont., in one department: Mathematics.

2. *Jarvis, C. D.*, Guelph, Ont., in two departments: Agriculture and Veterinary Science.

3. *Kennedy, W. J.*, Vernon, Ont., in three departments: Agriculture, Natural Science and Mathematics.

4. *Marshall, F. R.*, Westbrook, Ont., in two departments: Natural Science and Mathematics.

5. *Price, W. J.*, Marsville, Ont., in five departments: Agriculture, Natural Science, Veterinary Science, English and Mathematics.

6. *Raynor, M.*, Rose Hall, Ont., in two departments: Agriculture and English.

7. *Zavitz, H. V.*, Coldstream, Ont, in one department: Mathematics.

Second Year.

1. *Clark, G. H.*, Cainsville, Ont., in one department: Veterinary Science.

2. *Craig, R. D.*, Guelph, Ont., in five departments: Agriculture, Natural Science, Veterinary Science, English and Mathematics.

3. *McCalla, G. B.*, St. Catharines, Ont., in two departments: Natural Science and English.

4. *Reade, J. M.*, Toronto, Ont., in one department: Natural Science.

5. *Ross, H. R.*, Gilead, Ont., in two departments: Agriculture and English.

6, *Summerby, W. L.*, Russell, Ont., in three departments: Natural Science, English and Mathematics.

Medals.

Gold Medal.—George Bruce McCalla, St. Catharines, Lincoln, Ont.

Governor-General's Silver Medal.—H. R. Ross, Gilead, Hastings Co., Ont.

Second Silver Medal, Equal.—E. Beam, Black Creek, Welland Co, Ont.; J. M. Reade, Toronto, Ont.

Roland Craig, O. A. C., Guelph, Ont., 1st in Competition for Medals; W. L. Summerby, Russell, Russell Co., Ont., 3rd in Competition for Medals.—Both ruled out by special regulations.

The George A. Cox Scholarships.

First Year.

1. *Agriculture, Live Stock, Dairying, Poultry, and Apiculture.*—W. J. Kennedy, Vernon, Dundas Co., Ont.

2. *Natural Science.*—W. J. Price, Marsville, Dufferin Co., Ont.

3. *Veterinary Science.*—C. D. Jarvis, O. A. C., Guelph, Ont.

4. *English.*—M. Raynor, Rose Hall, Prince Edward Co., Ont.

5. *Mathematics.*—J. B. Anderson, St. Marys, Perth, Ont.; F. R. Marshall, Westbrook, Frontenac, Ont,—Equal.

Second Year.

1. *Agriculture, &c.*—Not awarded.
2. *Natural Science.*—G. B. McCalla, St. Catharines, Lincoln, Ont.
3. *Veterinary Science.*—W. G. B. Heartz, Halifax, Nova Scotia.
4. *English.*—H. R. Ross, Gilead, Hastings, Ont.
5. *Mathematics.*—R. D. Craig, O. A. C., Guelph, Ont.

PRIZE MEN.

First Year.

Agriculture, Live Stock, Dairying, Poultry, and Apiculture—1st, W. J. Kennedy; 2nd, M. Raynor.

Natural Science.—1st, W. J. Price; 2nd, W. J. Kennedy.

Veterinary Science.—1st, W. J. Price; 2nd, C. D. Jarvis.

English Literature, Grammar, and Composition.—1st, W. J. Price; 2nd, M. Raynor.

Mathematics, Book-keeping, and Drawing.—1st, W. J. Price; 2nd, W. J. Kennedy.

General Proficiency.—1st, W. J. Price; 2nd, W. J. Kennedy; 3rd, M. Raynor; 4th, F. R. Marshall; 5th, J. B. Anderson, St. Marys, Perth, Ont.

Second Year.

Agriculture, Live Stock, Dairying, Poultry, and Apiculture.—1st, H. R. Ross; 2nd, R. D. Craig.

Natural Science.—1st, R. D. Craig; 2nd, J. M. Reade.

Veterinary Science.—1st, G. H. Clark, Cainsville, Brant, Ont.; 2nd, R. D. Craig.

English Literature, Theses, and Political Economy.—1st, R. D. Craig; 2nd, G. B. McCalla.

Mathematics, Physics, and Electricity.—1st, W. L. Summerby; 2nd, R. D. Craig.

General Proficiency.—1st, R. D. Craig; 2nd, G. B. McCalla; 3rd, W. L Summerby; 4th, H. R. Ross; 5th, E. Beam and J. M. Reade, equal; 7th, W. B. G. Heartz, Spring Hill, Nova Scotia.

VALEDICTORY PRIZE.

A prize of $10 in books is offered annually to the second year students for a valedictory address. The subject last year was "The Live Stock Industry in Ontario," and the prize was awarded to H. R. Ross, Gilead, Hastings Co., Ont.

CLOSING EXERCISES.

Our closing exercises for the year took place on the 30th June. The weather was fine and the attendance of visitors large. The Hon. John Dryden presented the diplomas and spoke briefly on the work of the College. Rev. Dr. Potts also favored us with his presence, and delivered an address suitable to the occasion.

NEEDS.

Institutions which keep abreast of the times in scientific research are constantly reaching out and pressing forward; and the wants of such institutions are numerous. This is specially true of an agricultural college, because it has to do with the whole field of physical science.

Ontario Agricultural College and Experimental Farm, General View.

Within the last few years, large additions have been made to our equipment and, as a consequence, our work is broader and more thorough than at any time in the past; but our request is still for more. The attendance of students having increased beyond our residential accommodation, it becomes necessary for us to consider the question of enlarging our buildings. Something should be done at an early date; and my own judgment is, that it would be best to change the present library and museum into domitories; build an addition behind the present physical laboratory—ground floor for practical work in agricultural physics, and first and second flats for student's dormitories; and erect a new building for library and museum.

FINANCIAL STATEMENT FOR 1897.

I.—College Expenditure.

(a) *College Maintenance.*

1. *Salaries and Wages*		$ 20,257 03
2. *Food*—		
Meat, fish, and fowl	4,593 47	
Bread and biscuit	932 60	
Groceries, butter, and fruit	4,864 27	
4. *Household Expenses*—		
Laundry, soap, and cleaning	201 63	
Women servants' wages	1,914 40	
4. *Business Department*—		
Advertising, printing, postage, and stationery	1,148 01	
5. *Miscellaneous*—		
Maintenance of chemical laboratory	710 53	
" botanical laboratory	208 63	
" bacteriological laboratory	174 55	
" physical laboratory	82 01	
Library and reading room—books, papers, and periodicals	717 61	
Medals	87 75	
Unenumerated	727 68	
		$36,620 17

(b) *Maintenance and Repairs of Government Buildings.*

Furniture and furnishings	865 50	
Repairs and alterations	1,222 05	
Fuel	3,292 10	
Light	841 27	
Water	95 80	
Sewage disposal	433 28	
		6,750 00
		$43,370 17

College Revenue.

Fees	1,976 20	
Balance for board, after deducting allowances for work in outside departments	6,494 75	
Chemicals	30 00	
Gas in laboratories	95 00	
Laboratory fees	10 00	
Supplemental examinations	34 00	
Oil bought by college and sold to other departments	25 00	
Gas cylinders sold by biological department	25 00	
Sale of tuberculin	5 22	
Sale of sundry articles—bones, second-hand stove, old iron, etc	32 33	
Balance paid by Harrison for connecting water pipe to his house	92	
Contingencies—breakage, fines, etc	258 15	
		8 986 57
Net expenditure of the College in 1897		$34,383 60

Unexpended balance for the year, $422.40. (See Estimates for 1897, pp. 36 and 42.)

II.—Farm Expenditure.

(a) *Farm Proper.*

1. *Permanent improvements*—			
Fencing, underdraining, etc			422 12
2. *Farm maintenance*—			
Salary of superintendent		1,200 00	
Wages—herdsmen, teamsters, engineer, etc		2,948 52	
Live stock—steers, cows, etc		1,842 33	
Maintenance of stock		600 80	
Seed		173 01	
Binding twine		25 20	
Repairs and alterations (including blacksmithing)		441 68	
Furniture and furnishings		128 39	
Tools and implements		190 67	
Advertising, printing, postage and stationery		119 06	
Fuel and light		75	
Contingencies		63 70	
			7,734 11
			$8,156 23
Cash revenue of farm proper—			
Sales of cattle—24 head, mostly young animals		859 07	
" —11 steers, 15,210 lbs. at 5c	760 50		
" —7 steers, 8,930 lbs. at 4c	357 20		
	1,117 70		
Less allowance in deal	7 25		
		1,110 45	
Sales of pigs by auction—52, mostly young		611 36	
" " for slaughter—12,220 lbs. at average price of 4½c		549 90	
" sheep by auction—27, mostly lambs, average price $8.18½		220 98	
" wheat—264½ bush. at $1.00		264 50	
" oats—199 1-20 bush. at 40c		79 62	
" barley—183 38-48 bush. at 60c		110 28	
" peas—46⅔ bush. at 75c		35 00	
" potatoes—164 5-6 bushels at 30c		49 45	
" wool—541 lbs. unwashed at 13c		70 33	
" hides and skins—1 hide and 3 skins		5 65	
" milk—2,761½ quarts at 4c		110 45	
" hay and ensilage		13 81	
" old fence rails and boards		36 95	
" service of animals—cows and pigs		157 00	
Paid by Harrison for use of man and team		11 25	
			4,295 55
Net expenditure of farm proper			$3,860 68

Unexpended balance for the year, $1,114.32. For full returns from the farm proper, see Mr. Rennie's figures in Part XI.

(b) *Experimental Plots and Feeding.*

1. *Permanent improvements*—			
Alterations in buildings, furnishings, etc		$178 01	
2. *Maintenance*—			
Experimentalist, salary		1,500 00	
Foreman, salary part of year		222 00	
Feeder, wages		360 00	
Teamsters		558 00	
Laborers		2,217 93	
Seed		355 15	
Manure and special fertilizers		229 92	
Stock—cattle and pigs for feeding		1,021 90	
Furnishings and repairs, including blacksmithing		272 65	
Printing, postage, and stationery		142 88	
Implements		213 78	
Feed and fodder		450 19	
Contingencies		107 48	
		7,829 89	
Revenue.—			
Sales of cattle—9 head	509 97		
" pigs—86 head	621 95		
		1,131 92	
			$6,697 97

Over-expenditure for the year, $299.97. (See Estimates, p. 37.)

III.—Dairy Department.

(a) *Experimental Dairying.*

Salary of foreman—instructor, butter-maker, and experimenter, 9½ months		$514 58	
Experimental cheese-maker, 9½ months		500 00	
Man to assist in experimental work, attend boilers, etc , 9½ months		278 93	
Assistant in chemical laboratory, employed in analyzing milk, etc		75 00	
Cattleman, milkers, etc		510 25	
Temporary assistance		92 30	
Purchase of milk for experimental work		2,083 78	
Purchase of cows and pigs		615 48	
Feed and fodder		380 74	
Furniture, furnishing, and repairs—new separators and vats, new chimney, etc.		1,052 76	
Advertising, printing, postage, and stationery		124 78	
Fuel and light		332 86	
Contingencies		101 91	
		6,663 37	
Revenue—			
7,904 lbs. butter at 20 1-50	1,582 44		
13,717 lbs. cheese at average of 8⅝c	1,189 65		
4,245 qts. milk at 4c	169 79		
14,540 lbs. skim and butter milk at 15c per 100	21 81		
8 calves	15 50		
11 cows	325 00		
Pigs—12,298½ lbs. at 5c	614 93		
3 hides	10 47		
	3,929 59		
			$2,633 78

Unexpended balance for the year, $1,536.22. (See Estimates, p. 38.)

(b) *Dairy School.*

Wages of instructors, 2½ months		1,582 49	
Engineer		105 00	
General helper		75 00	
Services of boy and board of engineer		43 60	
Purchase of milk		3,788 74	
Dairy appliances—pasteurizing apparatus, utensils, etc		609 14	
Expenses of cheese and butter judges		9 00	
		6,212 97	
Revenue—			
Registration fees	63 00		
10,194 lbs. butter at 19 4-5c	2,015 88		
14,002 lbs. at 8 96-100c	1,255 11		
20,350 lbs. skim milk at 10c	20 35		
7,750 lbs. butter milk at 10c	7 75		
Whey	20 00		
	3,382 09		
			$2,830 88

Unexpended balance for the year, $249.12. (See Estimates p. 38.)

IV.—Poultry Department.

Salary of manager		$ 700 00	
Stock—6 birds		21 50	
Furniture and furnishings, etc		113 53	
Feed, etc.		131 87	
Fuel and light		41 31	
		1,008 21	
Revenue—			
Eggs for hatching—93 settings	128 50		
" college—188 doz	35 97		
Stock sold—105 birds at 81 7-10	85 79		
18 dressed chickens	5 00		
	255 26		
			752 95

Unexpended balance for the year, $247.05. (See Estimates, p. 38.)

V.—Horticultural Department..

Garden, green houses, lawn, arboretum, orchard, forest tree plantations, etc.

1. *Permanent improvements*—new greenhouse, staging, painting, etc.	150 47	
2. *Maintenance*—		
Head gardener and foreman	649 92	
Assistant gardener and florist	528 00	
Assistant in greenhouses	375 00	
Teamster and laborers	1,702 91	
Manure	90 50	
Trees, plants, bulbs, seeds, etc	254 24	
Furniture, furnishings, and repairs, including implements and flower pots	453 84	
Fuel and light	636 02	
Contingencies	28 02	
		4,868 92
Revenue—		
1,196 boxes of strawberries at 4c	47 85	
Team hauling stones for Harrison, 6 hours	1 80	
		49 65
Unexpended balance for the year, $248 73. (See Estimates, p. 38)		$4,819 27

VI.—Mechanical Department.

Salary of foreman	$700 00	
Extra carpenter for erection of buildings	700 00	
Tools, etc	60 19	
Fuel and light	23 92	
		$1,484 11

Over-expenditure for the year, $9.11. see Estimates. p. 39.)

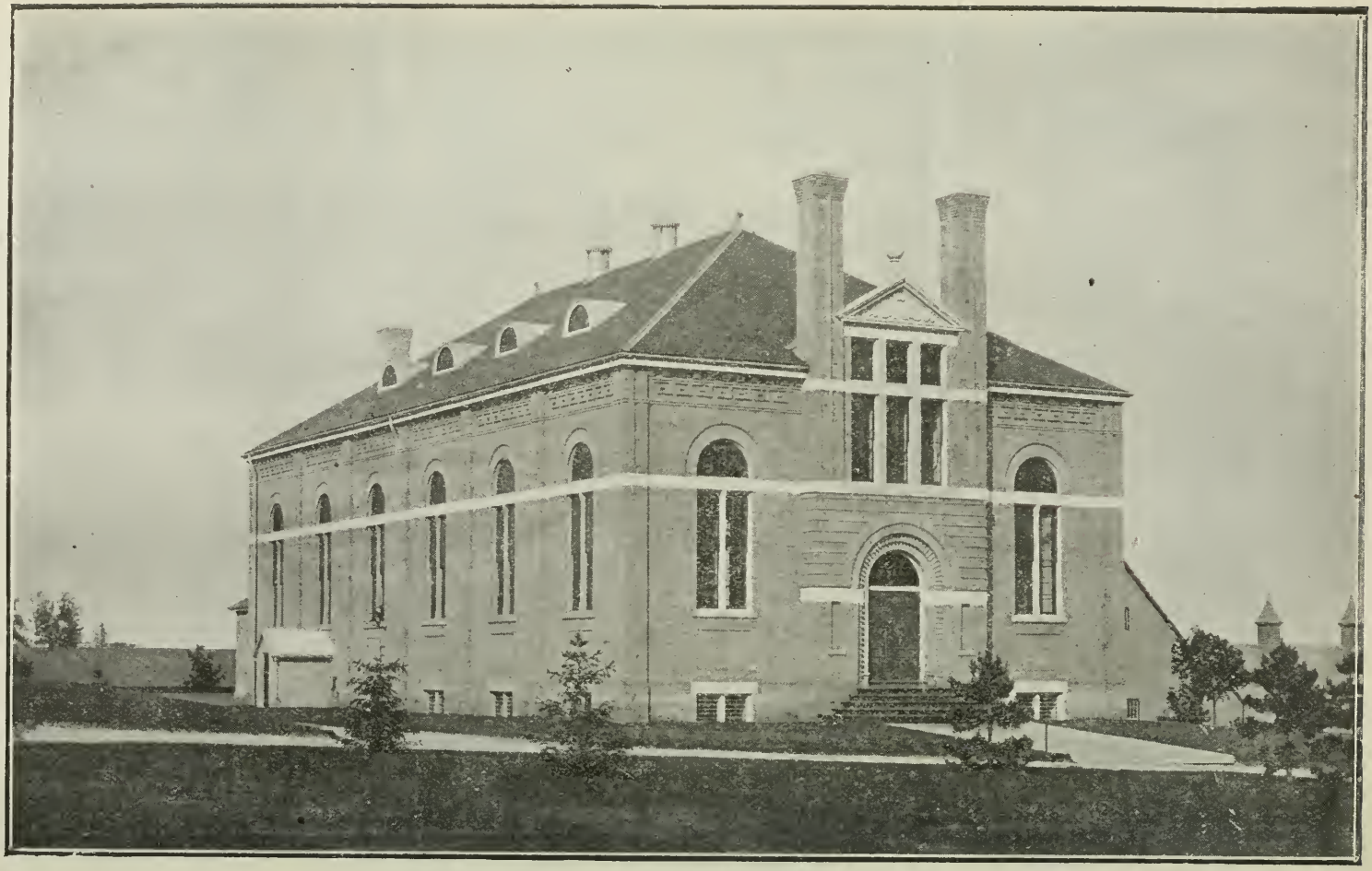
Summary.

Total net expenditure in all departments—College, Farm, etc.

I. College and Government buildings	$34,383 60	
II. Farm—		
1. Farm proper	3,860 68	
2. Experimental plots and feeding	6,697 97	
III. Dairy Department—		
1. Experimental Dairy	2,633 78	
2. Dairy School	2,830 88	
IV. Poultry Department	752 95	
V. Horticultural Department—garden, greenhouses, lawn, arboretum, orchard, forest-tree plantations, etc	4,819 27	
VI. Mechanical Department	1,484 11	
		$57,463 24

The unexpended balance on the year's operations in all departments was $3,508.76.

JAMES MILLS,
President.



Convocation Hall and Gymnasium, O. A. C., Guelph.

PART II.

REPORT OF THE LECTURER

IN ENGLISH LITERATURE AND PHYSICS.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to present herewith my report in the departments of English Literature and Physics.

ENGLISH LITERATURE.

Last year I gave rather a full report on the work in this department, and as no special changes have been introduced since last year, a very brief reference is all that is necessary. I am pleased to be able to state, or rather repeat, that the interest in the study of literature here is continuous, and especially is this true of Shakespeare studies. Essay writing is being more and more emphasized. Your assistant in the residence, Mr. Clark, reads the essays for the First Year, and he reports a steady progress in carefulness, neatness and accuracy. The same is true of the other years. Questions of the day are discussed in these essays, relating either to practical matters of the farm, or to live issues in the larger world outside of the farm. Following are some of the subjects given to the different years: Preparation of ground for fall wheat, the Klondyke, college sports, principal world events of 1897.

I am exceedingly grateful to you and to the librarian, Mr. F. C. Harrison, for the large number of books of English authors and commentaries thereon, that have been added to the library in the past year. A very generous and judicious selection has been made. I am now able to give each class a good list of reference works, which makes the study and the teaching of English more easy and more interesting. We have now the beginnings of a good English library.

PHYSICS.

I am pleased to be able to state that the work in the department of Physics is gradually extending. This present term, for the first time, a course of lectures has been outlined for the First Year, consisting mainly of Soil Physics practically considered in its relation to cultivation, drainage, soil fertility, and soil moisture. One lecture a week is being given to cover this work, with the expectation of finishing with the close of the fall term. It may be necessary to continue the lectures through a part or all of the winter term, if the whole of the course outlined is to be covered.

The Second Year work remains much the same as last year. Three lectures a week are given, principally on Mechanics. A very important part of the instruction in this branch of Physics is practical, being an investigation of the principles of machines, and is carried on during the afternoons, in addition to the forenoon lectures. I have also included in the fall term's work practical instruction in measuring land areas, chaining, levelling for drains, and allied subjects. I am doing my best to give the class a complete course in practical instruction, but find it rather difficult to give them sufficient personal attention, since part of the class is in the field chaining while part is in the laboratory employed on mechanical appliances there. However, I have succeeded in keeping them employed for two afternoons a week since the opening of the term and expect to continue until near the close. During the winter term, hydrostatics, thermodynamics, and hydrodynamics will be discussed and specially applied to Soil Physics. In the spring term, electricity as usual. The Third Year course is an extension of that of the Second Year.

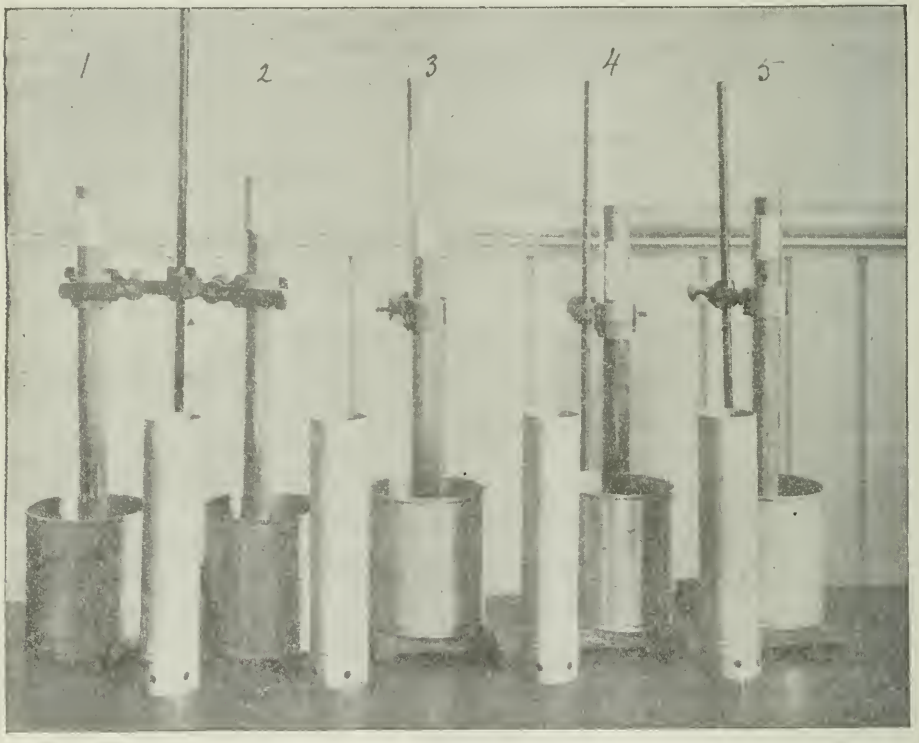


Fig. 1.

In addition to lectures and laboratory instruction, a little independent investigation has been done, as time has allowed. Following are some of the results obtained:

The Physical Effects of Lime on Soils.

To determine these, zinc cylinders, as in the figure above, were nearly filled with the soils prepared according to the description found in the following tables No 1, 2 and 3. The soil rested on wire gauze at the rim just above the holes. The cylinders, when filled with the dry soil, were placed in water just deep enough to cover the rims; and the water rose to the surface by capillary action. The water-coefficient is

$$\frac{\text{The volume of water taken up by the soil}}{\text{The volume of the soil}} \times 100.$$

The numerical results are given in the tables. Two kinds of clay were used, both sent for examination by Mr. J. J. Devitt of Freeman, Ont.

Table 1.

Sample.	Clay.	Clay 80%, Humus 20%.	Clay 80%, Lime 20%.
Time in reaching surface	9 hours.	12 hours.	3¼ hours.
Water-content	50.4%.	58.8%.	51.7%.
Condition after drying	Hard.	Friable.	Very friable.

Table 2.

Sample.	Clay.	Clay 80%, Humus 20%.	Clay 90%, Lime 10%.
Time in reaching surface	24 hours.	26 hours.	5 hours.
Water-content	50.9%.	56.6%.	51.1%.
Condition after drying	Very hard.	Medium.	Friable.

Table 3.

Sample.	Lime .5%, Sand 99.5%.	Lime 1%, Sand 99%.	Lime 2%, Sand 98%.	Lime 6%, Sand 94%.	Lime 10%, Sand 90%.
Time in reaching surface	10 minutes.	11 minutes.	13 minutes.	23 minutes.	30 minutes.
Water-content	35%.	35 9%.	36.7%.	40.5%.	42.8%.
Condition after drying	Friable.				Quite adhesive

The greater the amount of lime used, the greater the effect; and a small percentage of lime has only a proportionately small effect. *To lime one acre* to a depth of 3 inches with ½ per cent of lime by weight, that is, one pound of lime for every 200 pounds of soil, *would require 2 tons.* That quantity would have a very considerable effect on any soil. In our experiments we used larger percentages in order to obtain measurable effects on small lots of soil. The conclusions may be stated thus:

1. Lime increases the water capacity of all soils.
2. Lime makes *clay more friable* and *sand more adhesive.*
3. Lime makes *clay more pervious* and *sand more close.*

It must be remembered that while the physical action of lime is thus beneficial, it has also a chemical action in setting free the plant food in the soil. Since heat is a most active agent in the decomposition of manures and vegetable matter generally, in a cold, close, heavy clay soil this decomposition may not proceed fast enough for the use of crops, and hence a little lime is very beneficial both physically and chemically. But in a well-drained and warm sandy soil, this decomposition generally goes on fast enough; and here lime may be an injury, since it may decompose the plant food faster than the crops require it, and the result may be an impoverishing of the soil. Lime, therefore, is most beneficial in close, clay soils, since it is to be regarded not so much as a food, but as a stimulant.

Experiments in Capillarity with Long Tubes.

Figure 2 and table 4 contain nearly all the information needed regarding this experiment. It illustrates chiefly the movements of soil-water in different strata of the soil. The only difference in the three samples is the amount of humus contained, 0-6 inches

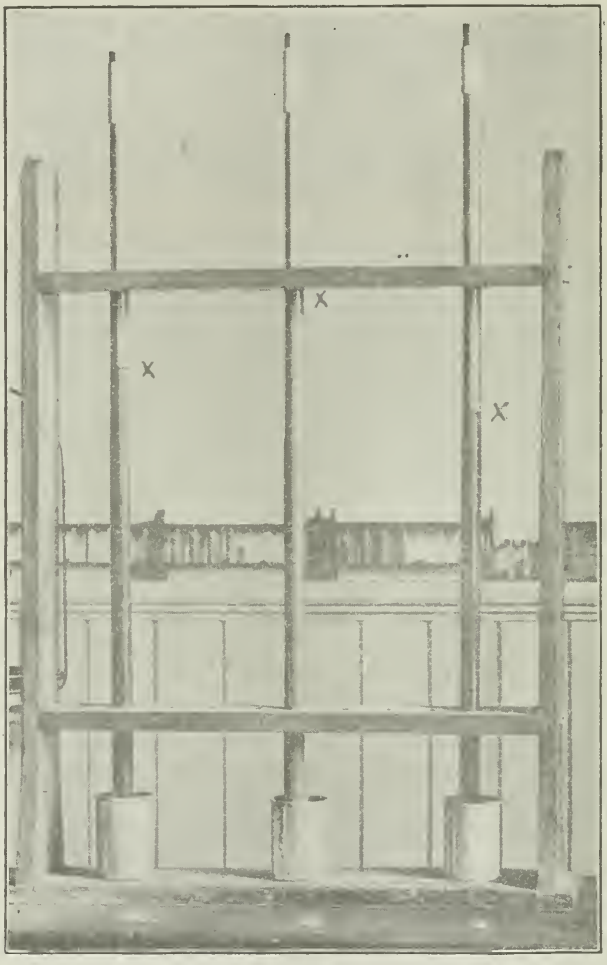


Fig. 2.

being well supplied, as it is surface soil, 6-12 containing a little, and 12-18 none at all. I wish to draw attention to (1) the rate of movement of the water, and (2) the amount of water retained by the soil in each tube.

Table 4.

Sample.	Loam.	Loam.	Loam.
Location	Expl. Field.	Expl. Field.	Expl. Field.
Depth from surface	0-6 inches.	6-12 inches.	12-18 inches.
Height of water reached in tube in 1 day	9 inches.	11 inches.	14 inches.
Height of water reached in tube in 4 days	15 5 inches.	17 inches.	25 inches.
Height of water reached in tube in 11 days	20.5 inches.	21 5 inches.	35 inches.
Water content in 1 day	46%	43%	39.4%
Water content in 4 days	49%	42 9%	39.7%
Water content in 11 days	45%	42 7%	39 5%

Table 5.

Sample.	Height of water reached in tube.			Sample.	Water content per cent.		
	Pure sand.	Sandy soil.	Clay loam.		Pure sand.	Sandy soil.	Clay loam.
2 days	25.08 in.	18.88 in.	20 in.		26.96	27.88	37.88
3 days	25 52 in.	19.6 in.	21.33 in.		27.36	28 38	37.61
4 days	26 in.	20 in	22.4 in.		27.01	27.16	36.77
5 days	26 6 in.	20.6 in.	23 6 in.		26.4	27.44	36.71
6 days	26.6 in.	21 in.	24 2 in.		26 4	27.24	37.11
7 days	26.6 in.	21.3 in.	25 in.		26.4	27.5	36.3
				Average.	26.75	27.6	37

Table No. 5 gives the result of an experiment very similar to the preceding, the difference being a comparison of entirely different soils, instead of soils from different depths of the same field. The following conclusions may be drawn :

1. The capillary action was at first more rapid in the pure sand.

2. The pure sand could not raise the water more than 26.6 inches from the level of the standing water below. The limit was reached in 5 days, while the other soils continued their action.

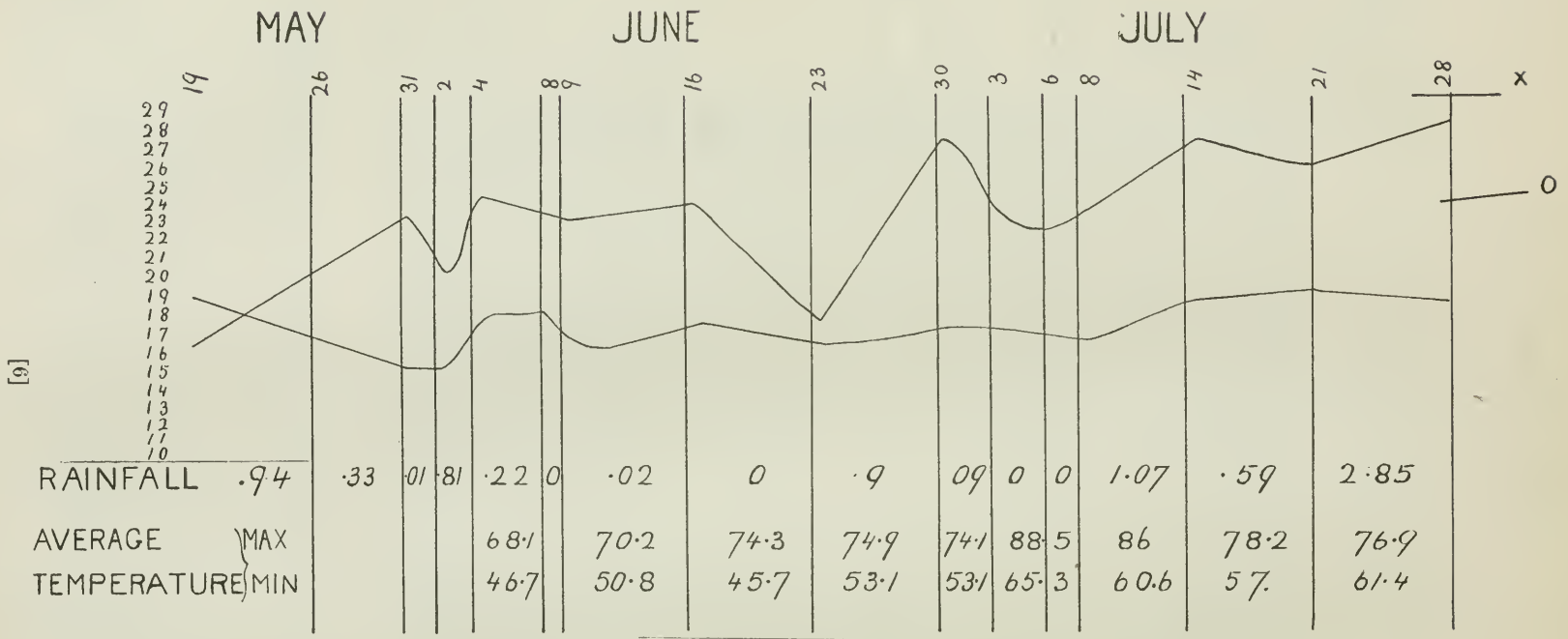
3. The farther from the level of free water, the slower is the capillary movement of water.

4. The fine clay soil absorbs about 35 per cent. more water than either of the other samples.

Variations of Soil Moisture through May, June and July.

During the months May, June and July, I conducted, with the assistance of Mr. A. C. Wilson, a series of experiments with a view to determining the variations of the soil-water throughout the season. The samples of soil were taken from the College corn field. Two lots were taken at each test, one lot being to the depth of 9 inches, and the second lot below the first to the depth of 18 inches from the surface. The samples were dried and the percentage of water determined This was done at stated intervals, generally once a week, with occasionally an extra test when a heavy rainfall occurred. The amounts of rainfall and the temperature readings were obtained from the Experimental Department. The subjoined map indicates graphically the moisture variations. The figures at the top refer to the dates at which the tests were made and those at the left indicate the percentage by weight of water in the soil as it came from the field. For instance, on June 30th, in 100 pounds of surface soil there was 27.4 pounds of water, and in 100 pounds of subsoil, on the same date, there was 17 pounds of water. The upper curve refers to the surface, and the lower curve to the subsoil.

Our determinations date from May 19th. On May 17th, 18th and 19th, the corn was sown. The cultivation during these three days and previously had effected a rapid drying of the surface, and on May 19th the surface soil contained only 16.3 per cent. of water, while the subsoil contained 19 per cent. This inequality could not last long, however, since, in a state of equilibrium the surface soil contains more water than the subsoil in proportion to the amount of humus contained. Hence, as the diagram shows, the moisture content of the surface rose, due to percolation of rain from above and to capillary action from below, while the subsoil lost. Each rainfall is clearly indicated by an upward shoot of the curve belonging to the surface, and a dry, hot spell is as clearly indicated by a drooping. The surface is of course subject to greater daily variations, while the subsoil pursues a more even tenor. Between June 2nd and June 4th. quite a heavy rainfall occurred (.81 inch), and we see by the diagram that



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RAINFALL	.94	.33	.01	.81	.22	0	.02	0	.9	.09	0	0	1.07	.59	2.85
AVERAGE TEMPERATURE	MAX				68.1		70.2	74.3	74.9	74.1	88.5		86	78.2	76.9
	MIN				46.7		50.8	45.7	53.1	53.1	65.3		60.6	57.	61.4

X SATURATED POINT OF SURFACE — 30.7

0 " " " SUBSOIL — 24.

the subsoil felt the effect considerably. Elsewhere, the subsoil was but little responsive to changes in the weather, and the rain that fell was mostly retained by the surface nine inches. This would not be the case in a poor soil, since such a soil would allow the rain to percolate rapidly through it, and the subsoil curve would present almost as great variations as that of the surface. The quality of the soil is indicated by the yield of corn—20 tons per acre.

The high moisture-content from June 4th to June 8th, accompanied by a comparatively low temperature, made the soil both wet and cold. Corn while germinating, and even after, is quite susceptible to cold, and on this occasion the corn did not sprout. On consulting Mr. Rennie's record of the season's work, I learn that the corn was re-sown on June 7th, 8th and 9th. From June 9th to 16th, with only a slight rainfall, the curve rises in both the surface and the subsoil. They were both, in all probability, drawing from the reserve fund of water below. After the 16th, the continued dry weather, added to a high temperature, succeeded in reducing the moisture-content of the surface considerably, and the subsoil curve droops sympathetically. At no point after about May 22nd does the surface curve fall below that of the subsoil. This is due to the higher capacity for moisture of the surface. Surface soil may contain more water per pound of soil than the subsoil, and yet be no wetter, just as a pound of water at 60 degrees contains much more heat than a pound of iron at the same temperature, as is evidenced by the more rapid cooling of the iron.

On July 26th, the big rain began, which did such damage to crops throughout the country. Our experiments concluded on July 28th, and at that time the surface soil contained more water than at any other time of the season since May 19th, as the curve indicates.

It cannot be claimed that these results are of any great immediate importance, since there is a total lack of comparison between different conditions. There is, however, in these results a clear indication of what might be accomplished in this direction. I intend, with your approval, to suggest a series of experiments to the Experimental Union, wherein the question of soil moisture may be studied under different conditions, viz., different *soil* conditions, different *weather* conditions, different *methods of cultivation*, and different *crops*. The last two conditions can be investigated locally, without co-operative assistance, and I hope to be able to institute a research along these lines next season from experiments to be made at the College. To introduce different weather and soil conditions, samples of soil may be sent from representative districts in Ontario, and the amounts of moisture determined here. I am positive that results of great practical importance may be reached by such a series of experiments, especially if conducted through a term of years. The work is quite new. Kansas Experiment Station has sent in a bulletin showing the determinations for one month, June, 1897, under various methods of cultivation. Washington has done some work very similar for the seasons 1895 and 1896, but in none of those places has anything been done until quite recently.

Last May quite a number of gentlemen from the neighborhood of Stouffville visited the district of Lake Temiscaming, with a view to purchasing claims if they found favorable conditions there. Following is a report on some samples of soil sent in by them for analysis and examination :

Examination of Soil from Lake Temiscaming sent by Mr. Joseph Steele, of Stouffville.

The samples sent were three, namely :

1. Surface soil from which one crop had been taken.
2. Soil from the root of an upturned tree.
3. Soil from a depth of five feet.

Sample 1 and 2 are practically the same in composition, with the exception that the surface soil contains more vegetable matter. A machanical analysis of the surface soil was made, with the following result, side by side with a similar analysis of a sample of sandy loam taken from a cornfield at the College farm.

	Lake Temiscaming.	College.
Gravel	.29 per cent.	.32 per cent.
Coarse sand	2.63 "	1.50 "
Fine sand	3 70 "	29.06 "
Coarse silt	5 71 "	24.67 "
Fine silt	8 03 "	21.35 "
Clay	79.64 "	23.10 "

It is evident from these figures that the sample in question is a very fine clay soil. In the College sample, the first four subdivisions—gravel—coarse silt—are almost entirely composed of quartz, looking like small bits of granite, while in the Temiscaming sample there is scarcely a trace of quartz or rock. The coarser parts of this soil may be resolved into two, some woody matter being undecomposed humus, and some yellowish grains, which when rubbed slightly, pulverized quite easily. After the first analysis, these coarser parts were pulverized, and the finer particles washed away. The coarse residue consisted almost entirely of woody matter. So that, while the Lake Temiscaming soil contains a small percentage of coarse parts, these are not rock or quartz, but clay formed into lumps containing a trace of iron oxide. The soil is then a fine, white clay, practically free from rock or quartz.

Another conclusion drawn from a comparison of the two soils is the relative quantities and the condition of the humus, or vegetable matter, contained in them.

If drainage conditions are favorable, there is nothing wrong with soil that has a good supply of humus in proper condition. Now, in the coarser parts of the College sample, there was only a trace of black specks, or humus. In the finer parts, however, the dark color indicated an abundance of well decomposed humus. In the Temiscaming sample, the finer subdivision, clay and silt, was almost white in color, indicating a lack of humus. The coarser parts, as stated above, were mostly composed of woody matter. As to the total humus content, a comparison of the colors of the two samples clearly indicated that the Temiscaming sample is not so well supplied with humus as the College sample. I was unable to understand this at first, as the Temiscaming soil is practically a virgin soil, and should be rich in vegetable mold. I have learned, however, that the surface was burned over no very long time since, and possibly the humus was burned out then. It is not meant by these remarks to convey the impression that the soil in question is at all impoverished, but simply that there is no very large reserve fund of fertility which can be drawn upon by crops for years to come. A good system of farming, such as is necessary in this part of Ontario, had better be applied at Lake Temiscaming from the beginning Then the soil will be in a better condition in ten years than it is now. It should give very good results from the start, judging from the physical analysis given above and the chemical analysis given below. Only the principal ingredients required by crops—phosphoric acid, potash and nitrogen—are given, and side by side are given the proportions required to constitute a fertile soil.

	Lake Temiscaming.	Req'd for fertility.
Phosphoric acid	.292	.20
Potash	1.98	1.
Nitrogen	.16	.15

It will be seen that the sample in question exceeds the requisites for fertility in phosphoric acid by 46 per cent., in potash by 98 per cent., and in nitrogen by only 6 per cent. The nitrogen is furnished principally by decomposed vegetable matter, especially clover and peas. A crop of clover would improve the condition of the soil, both in fertility and texture.

It should be explained that the chemical analysis given above was made two years ago at the Chemical Department, from a sample of soil sent from the same district. It may be found in the College report for 1894.

Water Capacity.

The amount of water that soil can hold in suspension is another important physical property. In ordinary seasons a high water capacity will secure a plentiful supply of water and plant-food for growing crops. The figures given below represent the volume of water retained in a known volume of soil, say a cubic foot, under natural conditions, such as a rain fall. The soil is saturated to determine these results; while the water is free to drain away below. If the volume of soil used be represented by 100, these figures will represent the maximum volume of water retained by it.

Lake Temiscaming (surface soil) 60% water capacity.

College 56.5% water capacity.

L. T. (from root of upturned tree) 53.7% water capacity.

College (9 inches below surface) 50.4% water capacity.

In this respect, then, the sample is considerably above the average, which may be taken for surface soils at 51 and for subsoils at 44.

Texture.

By texture may be understood the mechanical condition of the soil while under cultivation. It may be viewed from two points: First, whether or not it is friable and easy to work; secondly, whether or not it is impervious to the water. As to the first, judging from the firmness of its composition, it might be supposed to be a stiff and stubborn clay. To test this some of the soil was formed into a mould, then thoroughly saturated and dried while in that form. Many clays, especially the red clays, when thus treated, would require a hammer to pulverize them. This soil, however, pulverized with an easy pressure of the thumb and finger. So that for clay soil, it is exceedingly friable; and if drainage conditions are favorable, as I understand they are naturally, and if a sufficient quantity of humus be preserved in this soil, there will be no difficulty with regard to baking or becoming difficult to work.

Further, through all soils of fine composition the water moves slowly, and this soil is no exception to the rule. The subsoil from five feet below the surface is especially close. But it does not present any greater difficulties than the average clay soil, so far as can be judged by laboratory examination. It is only a question of sufficient drainage to make it tractable. The alternate wetting and drying that takes place under a good system of drainage, either natural or artificial, will keep even a clay soil porous, since clay expands when wet and shrinks on drying, thus leaving pores or openings throughout the soil. This applies both to the surface and to the subsoil. Reports from that district state that natural drainage is all that can be desired. If so, the soil will present but little difficulty, either in working or draining it.

Another sample of soil was sent later by Mr. Steele, taken from a spot six miles back from the lake where the previous sample was selected. This last sample, while the same in foundation as the first, contains much more humus, and the humus is much more decomposed. The sample is better adapted for immediate cropping, and is much more friable and porous, and altogether approaches more nearly to the condition of the ideal virgin soil. It presents the appearance that the lake sample should present after some years of liberal manuring and judicious cultivation and cropping.

Needs of the Department.

The quarters allotted to the department of physics two years ago seemed ample at that time. Since then, however, large additions have been made to the course, especially

in practical instruction. This fact, added to the increased attendance, both in the second and third years, has made the physical laboratory too small. What we need now is (1) the present room fitted up for laboratory instruction alone ; (2) a new class-room ; (3) a new room for experiments and station work.

If any station work is to be carried on, such as I have suggested, in connection with the soil-moisture determinations, an allowance for a fellowship in physics or other assistance is needed. Without assistance I cannot carry on this work, nor can I give sufficient attention to the students in their practical work throughout the year. Mr. A. C. Wilson rendered valuable help last year, while he was concluding his third year course and afterward during the summer. If provision can be made for permanent assistance in this young and growing department, I hope to render full value to the College and to the Province for the expenditure.

My thanks are due to you for the liberal grant made last year toward the purchasing of new appliances, and also for the electrical outfit provided. I have been enabled thereby to present the subject of electricity with much greater clearness and effect, and to make the whole subject of physics more valuable and practical as a part of the course in agricultural science.

Respectfully submitted,

J. B. REYNOLDS.

Ontario Agricultural College,
Guelph, November 30th, 1897.

PART III.

REPORT OF THE

PROFESSOR OF BIOLOGY AND GEOLOGY.

To the President of the Ontario Agricultural College :

SIR,—The time at which I should write the report of my department finds me prostrated upon a bed of illness, utterly unable to give a statement of the work of a busy year with that fulness it demands. From the 5th to the 26th of January, my time was completely taken up attending Farmers' Institutes. I was at seventeen, and delivered forty-five lectures upon topics relating to agricultural science. When spring opened, the work of answering inquiries began, and I may say that more information has been sought during this year by farmers, fruit-growers, and others than during any previous year of my connection with the College. Hitherto it has been customary to give a list of the names of insects, weeds and fungi identified, with the object of educating, as far as possible, the farming community with regard to the common and scientific names of the foes which prey upon the crops of garden, orchard and field. This year we have deemed it expedient to omit this list.

On June 9th, I was requested by the Honorable Minister of Agriculture to proceed to the Niagara district, where it was reported that the San José scale had appeared. The infested orchard was that of Mr. Thonger, near Niagara-on-the-Lake. Delegates from Ottawa and from the Fruit Growers' Association met at this place on June 19th, 1897, and examination of the trees soon revealed the fact that they were undoubtedly infested with this serious insect pest. I had scarcely returned to the College when I was again requested to go, in company with Mr. Orr, to the same district and examine, as far as possible, to ascertain if the scale had attacked other orchards. After travelling from place to place for several days, we returned and submitted our report to the Department of Agriculture. It was now seen that this work would be sufficient to occupy much time, and Mr. Orr, who had charge of the experiments in spraying under the Agricultural Department, was appointed to look into the matter thoroughly and to ascertain, if possible, to what extent the insect had appeared in the Province, and also to find out whence it came.

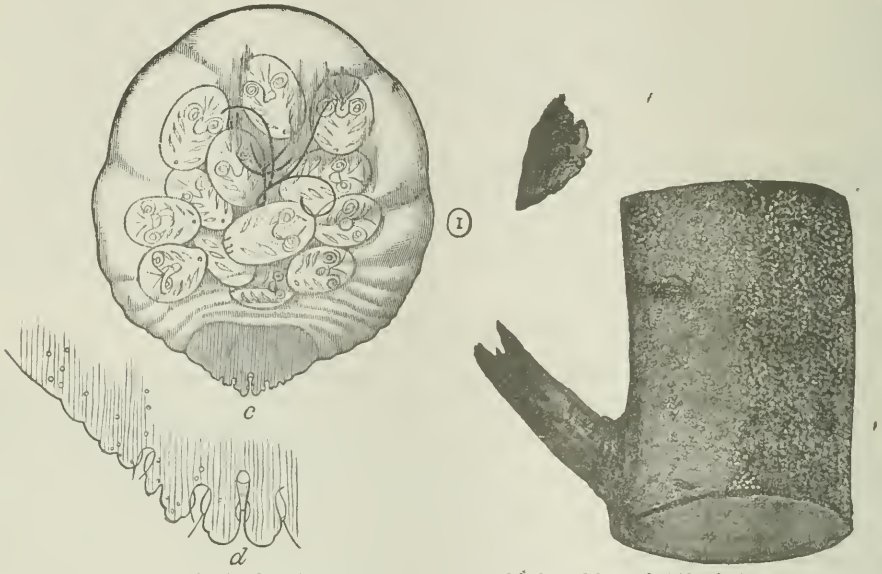
I prepared at that time the following bulletin, with the object of giving as clear, simple and concise a description as possible of the life history of the insect :

THE SAN JOSE SCALE.

(*Aspidiotus perniciosus*)

The discovery of the fact that the San José Scale has appeared in one of the most important fruit growing districts in Ontario demands that we furnish, at as early a date as possible, information regarding its habits, etc. For the past four years it has excited

much alarm among fruit growers in the Eastern States, and a wealth of literature has been published concerning it, so that all information needed is readily obtained from the numerous bulletins already issued from the Agricultural Department at Washington and experiment stations in the United States. No insect is more fitted to menace the fruit-growing interests of our Province than this San José Scale.



San José Scale, female enlarged, and part of infested branch (life size).

1. It possesses marvellous powers of reproduction. A single female that has wintered over may be the progenitor of millions in a single season ; some have computed that her progeny may reach the incredible number of 3,000,000,000. There may be four generations in a season, the adult females of each giving birth to living young for five or six weeks, the progeny of these bearing young when about thirty days old. Each female brings into existence 100,500 insects during her lifetime. Thus it will be seen that a great confusion of generations will soon exist, as there may be upon a plant at one time the young of several generations.

2. Infested young trees perish in two or three years.

3 The range of food plants is extensive, and all parts of the plant may be attacked—leaf, stem, twig and fruit. The scale has been found upon the peach, pear, plum, apple, cherry, apricot, quince, currant, gooseberry, raspberry, rose, hawthorn and even elm.

4. The insect and scale are exceedingly minute. The scale is often much the same color as the bark of the infested trees. Most are less than one-sixteenth of an inch in diameter, and are thus almost invisible to the naked eye.

5. It is readily introduced by nursery stock and fruit from infested trees.

Although first observed in 1893, it has now been located in Alabama, Florida, Georgia, Louisiana, Virginia, Delaware, Idaho, Indiana, Massachusetts, Maryland, New York, Ohio, New Jersey and Pennsylvania ; in 1894 it was reported in British Columbia ; and now, unfortunately, in June of 1897 we have to announce it as present in Southern Ontario. Some specimens are reported to have been found last winter near Chatham.

The general consensus of opinion, after much investigation, is, that it came originally from California, where it was noticed as a pest in the San José Valley as far back as

1873. In 1880 Prof. Comstock described it, and named the insect *Aspidiotus perniciosus*, on account of its serious character as a scale. It is believed to have been introduced into the East in 1886-7 by two New Jersey nurseries—one at Burlington, the other at Little Silver. These firms imported from the San José Valley a variety of Japanese plum, the Kelsey, which was claimed to be curculio proof. In 1889 or 1890 the first scaly stock from this importation began to be distributed, and in August of 1893 the San José Scale was first observed on the eastern side of the Rocky Mountains. It was located in an orchard of Charlottesville, Virginia, and since then each season has extended the list of infested districts.

In the work of distribution the insect itself can do but little, as it is quite helpless to move from place to place. Its life of active movement is very brief—a few hours, at the most a day or two. It moves only a few inches from its birth-place, then settles, becomes covered with a scale, and in the case of the female, remains fixed for life, and begins producing young in about thirty days. After becoming fixed, it lives by sucking the sap of the plant upon which it is located. The males have wings and may fly about at maturity, but the females are always wingless. During the few hours or days the tiny lice are moving about, they may get upon birds, such insects as ants and small beetles, and by them be carried to other trees. One observer has noticed that in infested districts, the scale is often more common near a bird's nest. As trees in a nursery grow close together, they present favorable conditions for being infested. Fruit from infested trees may have the scale upon it ; even wind may assist in spreading these insects that appear at first so comparatively helpless to travel by their own efforts. Thus *birds*, *insects*, *fruit*, *scions* from infested trees, infested *trees*, and *wind* may all be important factors in the distribution of the scale.

The nearly fully grown insect passes the winter beneath its wax-like scale. About June the young begin to appear, as exceedingly minute, six-legged insects, like yellowish specks moving about. They creep about only for a few hours, at most a day or two, then settle but a few inches from their birthplace, and become attached to the spot, from which the females never move. During their sedentary life the females lose their feelers and legs, and have neither eyes nor wings. The males, however, have legs, feelers (antennæ) eyes and wings in the adult condition. The scale of the female is circular, with a small nipple in the centre. This scale is from a twelfth to one-twentieth of an inch in diameter, and may be of a light or dark gray color, and usually is much the same color as the bark ; the nipple in the centre may be a pale yellow or blackish color. The scale of the male is oblong, with the nipple near one end, and is thus readily distinguished from that of the female. The female brings forth living young, and does not lay eggs, as is usually the case with scale insects, such as the oyster shell and scurfy scales. She may bring into existence from 100 to 500 young during the six weeks of her existence after reaching the adult stage.

The males develop about a week sooner than females, the latter taking about five weeks, and emerge from their scales as exceedingly minute two-winged fly-like insects. From June, when the young appear, a constant succession of generations is observed.

The scale of these insects is formed from a waxy secretion which commences soon after they come into existence, and forms a protective covering as development proceeds. In the earlier stages of growth the scale presents a somewhat grayish-yellow color, and gradually becomes darker.

The general appearance upon affected twigs is that of a grayish, slightly roughened scurfy deposit. This hides the natural reddish color of the young limbs of the peach, pear and apple. They sometimes even look as if sprinkled with ashes. If the scales are crushed, a yellowish oily liquid will appear from the crushed soft yellow insects beneath the scales. Examined in summer, many show orange-colored larvæ, snowy-white young scales, mingled with old brown or blackened matured scales. This insect produces a peculiar reddening effect upon the skin of the fruit and of tender twigs. An encircling band of reddish discoloration around the margin of each female scale is very marked on the fruit of pears. The cambium layer of young twigs, where scales are massed, is usually

stained deep red or purplish. Where the scales are few the purplish ring surrounding each is quite distinguishable.

Remedies. The remedies for this scale present three forms: *Corrosive washes*, such as whale oil soap; *penetrating substances*, such as gases or kerosene emulsion; and *varnishes* or *resin washes* which cover the scale so as to prevent the escape of the young.

1. The use of hydrocyanic acids, or the gas treatment, is very effectual, but it is only practicable in certain cases, especially in the treatment of imported nursery stock. The following method is given in Bulletin 87, of the New York Experiment Station, Geneva: "This gas is lighter than air, hence will work better if the generator is placed below the pile of trees to be treated. A convenient way would be to make a rack a little less than six feet long, five feet wide, four feet high. The bottom of the rack could be made of loose slats raised a few inches above the ground to allow room to place the gas generator under the rack. When the rack is filled with trees, a piece of gas-tight canvas thrown over the whole and fastened down at the sides by throwing dirt on the margins would complete the apparatus. One side could be left open till the water and chemicals are placed in the dish and the dish slipped beneath the rack. This gas is a deadly poison, and great care should be used not to breathe it while placing the dish under the rack.

"To generate the gas pour three fluid ounces of water in a glazed earthenware vessel, to this add one fluid ounce of sulphuric acid; place under the trees and then add one ounce by weight of fused cyanide of potassium. This will make gas enough to fill a space of 150 cubic feet." An hour's exposure will likely kill all the scale insects.

2. One of the most effectual remedies, and one readily applied, is the use of whale-oil soap, two pounds in one gallon of water. Apply this in the fall just as the leaves drop off, before the scales harden, and again in spring just before the trees bloom. Some recommend a weaker solution in the fall, one pound to one gallon of water, then just before the buds swell in spring, the stronger solution, two pounds to one gallon of water, Even the use of common soap has been followed by good results, but whale-oil or fish oil soap is preferable. Kerosene emulsion diluted with nine parts water, or whale-oil soap, one pound to four gallons of water, is good for summer treatment, as soon as the lice are moving. Three or four applications of this, at intervals of ten days, will destroy many insects, but as the females are continually producing young throughout the summer, the spraying should be kept up to be effectual. Fall or winter treatment with strong solutions is decidedly the most successful.

3. Pure kerosene is destructive to the scales, but will kill the trees unless great care is observed in its application.

The use of resin washes, though successful in California, has not given very decided results in the east.

There are two enemies to the scale among insects, both of which are reported to aid very materially in keeping the scale in check. One, the "Twice-stabbed Ladybird" (*Chilocorus bivulnerus*,) is very common on infested trees, apparently feeding upon the scale; the other is a chalcid parasite (*Aphelinus fuscipenius*).

Suggestions.

1. Examine carefully sickly trees and trees or scions brought from nurseries in infested districts.

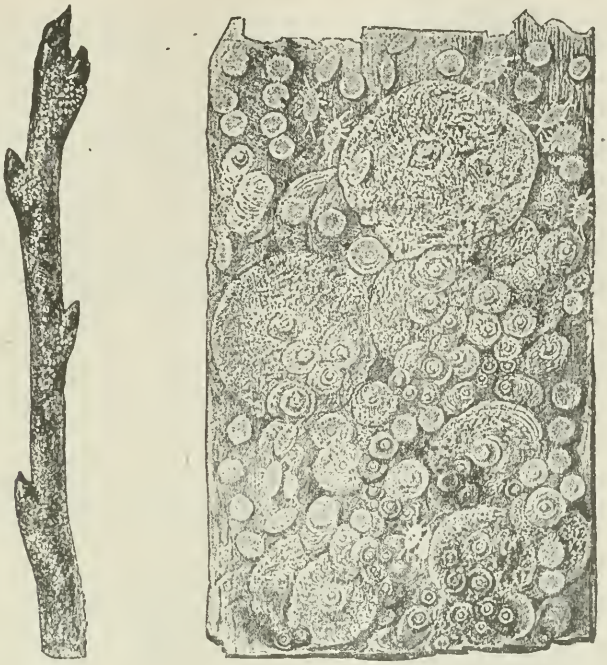
2. If only a few trees are infested, destroy them.

3. Trees infested, if well cut back and treated with whale-oil soap, as directed, may be largely saved.

4. Orchards set out within the last six years with trees from infested States, may be suspected. They should be carefully examined.

5. Examine fruit from infested localities

This most excellent cut, taken from Bulletin 3, U. S. Department of Agriculture, represents exactly what the writer of this bulletin has seen in the Niagara District.



a. *b.*

Appearance of scale on bark; *a*, infested twig—natural size; *b*, bark as it appears under hand lens, showing scales in various stages of development and young larvae.

I also prepared last spring a bulletin on spraying. It is as follows:

INSTRUCTIONS IN SPRAYING.

Solutions Recommended.

Bordeaux Mixture.	Copper sulphate	4 pounds.
	Lime (fresh)	4 "
	Water	40 gallons.

Suspend the copper sulphate in five gallons of water. This may be done by putting it in a bag of coarse material, and hanging it so as to be covered by the water. Slake the lime in about the same quantity of water. Then mix the two and add the remainder of the 40 gallons of water.

Warm water will dissolve the copper sulphate more readily than cold water. If the lime is at all dirty strain the lime solution.

If the lime is good the above amount is likely to be sufficient. It is an easy matter to know how much lime is required by using what is termed the ferrocyanide of potassium test. This substance can be got at any druggist's, and very little is required. Take a small bottle (2 oz.) and get it filled with a saturated solution of this compound. If there is not plenty of lime in your mixture, a drop of the test added to it, turns brown. Add

more lime and stir. As soon as the test fails to color in coming in contact with your mixture, it indicates there is sufficient lime present to neutralize the effects of the copper sulphate. Use wooden vessels in preparing the Bordeaux mixture.

Ammoniacal Copper Carbonate Solution.	Copper carbonate	1 ounce.
	Ammonia sufficient to dissolve the copper carbonate.	
	Water	10 gallons.

This solution is not much used, and is recommended only in cases where the fruit is so far advanced that it would be disfigured by using the Bordeaux mixture.

Paris Green Mixture.	Paris green	1 pound.
	Water	200 to 300 gallons.

Use 200 gallons of water in a mixture for apple trees, 250 for plum trees, and 300 for peach trees. When Paris green is added to Bordeaux mixture, so as to form a combined insecticide and fungicide, add four ounces to every 40 gallons of the Bordeaux mixture.

Hellebore.	White hellebore (fresh)	1 ounce.
	Water	3 gallons.
Pyrethrum.	Pyrethrum powder (fresh)	1 ounce.
	Water	4 gallons.
Kerosene Emulsion.	Hard soap	½ pound, or soft soap, 1 quart.
	Boiling water (soft)	1 gallon.
	Coal oil	2 gallons.

After dissolving the soap in the water, add the coal oil and stir well for 5 to 10 minutes. When properly mixed, it will adhere to glass without oiliness. A syringe or pump will aid much in this work. In using, dilute with from 9 to 15 parts of water. Kerosene emulsion may be prepared with sour milk (1 gallon), and coal oil (2 gallons), no soap being required. This will not keep long.

Notes.

1. When there is danger of disfiguring fruit with the Bordeaux mixture, use the ammoniacal copper carbonate solution.

2. Experience in spraying during the past two years indicates that it is best to use the combined insecticide and fungicide, commencing as soon as the buds begin to swell, again when the leaves appear, and continue it at intervals of 10 to 15 days, until the trees have been sprayed 3 to 5 times, which will depend upon the weather. In the case of a rainy season, it may be necessary to spray at least five times, while if dry, and the mixtures have been allowed to remain on the foliage, then three or four times may be sufficient.

In no case spray while the trees are in bloom, but immediately after.

3. The combined insecticide and fungicide, containing Paris green and Bordeaux mixture, is to be used for insects that chew, and injurious fungi, but kerosene emulsion alone for those insects that suck the juices of plants, such as aphis, thrip, red spider, etc.

4. A stock solution for the preparation of Bordeaux mixture may be prepared as follows: Dissolve 25 pounds of copper sulphate in 25 gallons of water. One gallon of this contains one pound of the copper sulphate. In another barrel slake 25 pounds of good lime, and add 12½ gallons of water. One gallon of this contains two pounds of lime. To make the mixture, take four gallons of the copper sulphate solution and two of the lime. If there is any doubt about there not being sufficient lime try the test already referred to under Bordeaux mixture. Now fill up the amount to 40 gallons with water.

5. Prepare the mixtures well, apply them at the proper time, and be as thorough as possible in the work.

TREATMENT.

APPLE. Treatment for destroying *codling moth*, *bud moth*, *tent caterpillar*, *canker worm*, *apple spot* and *leaf blight*:

First spraying: Bordeaux mixture and Paris green (4 oz. to the barrel of the mixture) when the buds are swelling.

Second spraying: Bordeaux mixture and Paris green before the blossoms open.

Third spraying: Bordeaux mixture and Paris green when the blossoms have fallen.

Fourth and fifth spraying: Bordeaux mixture and Paris green at intervals of ten to fifteen days, if necessary.

PEAR. *Leaf blight*, *scab* and *codling moth*, the same treatment as for the apple.

PLUM. *Curculio*, *brown rot*, and *leaf blight*.

First spraying: Bordeaux mixture before the flower buds open.

Second spraying: Bordeaux mixture and Paris green as soon as the petals have fallen.

Third spraying: Bordeaux and Paris green in seven to ten day after.

Fourth spraying: Bordeaux mixture in ten to fifteen days after.

PEACH. *Brown fruit rot*, *leaf blight*, and *plum curculio*.

First and second sprayings: Same as for the treatment of the plum.

Third spraying: Bordeaux mixture in two to three weeks.

Fourth spraying: Ammoniacal copper carbonate, if any danger of disfiguring the fruit with Bordeaux mixture.

CHERRY. *Aphis*, *slug*, *brown rot*, and *leaf blight*.

First spraying: Bordeaux mixture as the buds are breaking; if the *aphis* appears use kerosene emulsion alone.

Second spraying: Bordeaux mixture and Paris green, as soon as the blossoms fall.

Third spraying: Bordeaux mixture and Paris green ten to fifteen days after.

GRAPES. *Mildew*, *black rot*, and *flea beetle*.

First spraying: Bordeaux mixture and Paris green when leaves one inch in diameter.

Second spraying: Bordeaux mixture and Paris green when flowers have fallen.

Third and fourth sprayings: Bordeaux mixture at intervals of ten to fifteen days.

Paris green alone when the beetle is attacking the buds in the spring.

RASPBERRY.—*Anthracnose* and *leaf blight*.

First spraying: Bordeaux mixture just before growth begins.

Second spraying: Bordeaux mixture about when first blossoms open.

Third spraying: Bordeaux mixture when the fruit is gathered.

CURRANT AND GOOSEBERRY.—*Worms* and *mildew*.

First spraying: Bordeaux mixture and Paris green as soon as the leaves expand.

Second spraying: The same, ten to fifteen days later.

For worms alone, hellebore or Paris green will be effective.

TOMATO.—*Rot* and *blight.*

Spray with Bordeaux mixture, as soon as rot or blight appears, for three times, if necessary, at intervals of ten to fifteen days.

POTATO.—*Blight* and *beetles.*

First spraying: Paris green as soon as the beetles appear (one pound to 100 gallons of water).

Second spraying: Bordeaux mixture and Paris green, when plants six inches high.

Third and fourth sprayings: Bordeaux mixture at intervals of ten to fifteen days, if necessary.

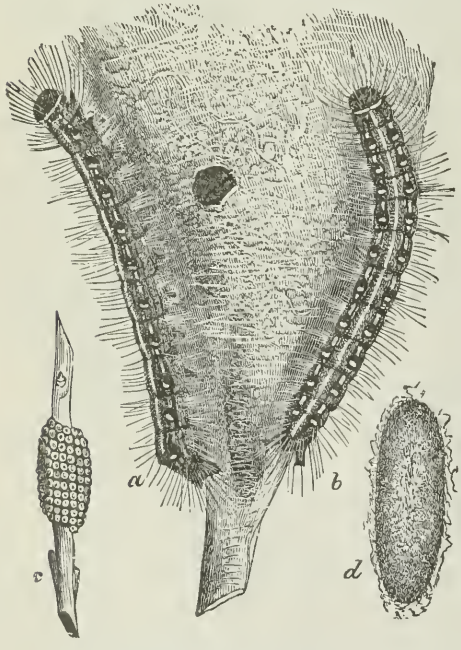
CABBAGE.—Pyrethrum applied in solution (one ounce to four gallons of water) or dusted on (one part pyrethrum to seven parts flour) for the cabbage worm.

STRAWBERRY.—The *rust* or *leaf-blight.*

Bordeaux mixture, when it can be applied without disfiguring the fruit, will control this disease. Apply at intervals of two or three weeks on new beds after they begin to make runners.

INJURIOUS INSECTS.

The following are some of the most common injurious insects that are troublesome in the garden and orchard. To destroy these, spraying as directed will be effective. To destroy insects only use an insecticide, but if treating for a fungoid pest at the same time use a combined fungicide and insecticide.



Tent Catterpillar: *a* and *b*, caterpillars; *c* egg cluster; *d* cocoon.

Tent Caterpillar moth.

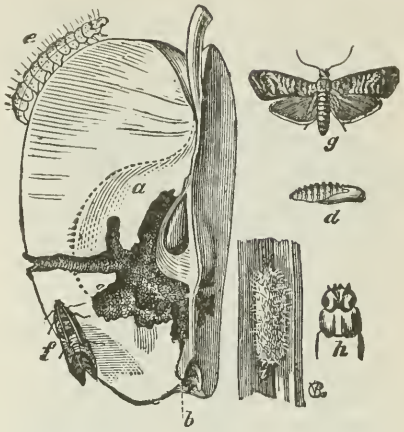
TENT CATERPILLARS.—*Clisiocampa Americana*, and *C. Sylvatica.*—These insects weave large webs in the branches of the apple tree, and do much damage feeding upon the foliage of the trees. It also attacks the plum and cherry. The eggs—200 to 300—are laid in rings upon the twigs of the trees and can be readily seen, so that many of them might easily be destroyed during the winter. The caterpillars grow rapidly. *Americana* has a white strip down the back, and *Sylvatica* a series of white spots, and thus they are readily distinguished from each other. Both develop into brown moths. The accompanying cut represents the different stages of the insects. *C. Americana.*

Remedy—1. Collect the egg clusters in winter. 2. Crush the "tents" when full of caterpillars. 3. Apply Paris green alone or with Bordeaux mixture.

Codling Moth.— *Carpocapsa pomonella* The eggs of this tiny moth are laid on the calyx of the young apple, while it is turned up. As soon as hatched the larva burrows into the apple, where it feeds until fully developed. Affected apples fall to the ground, and often contain the worms in them. The cocoons are frequently under the bark and in other sheltered spots.

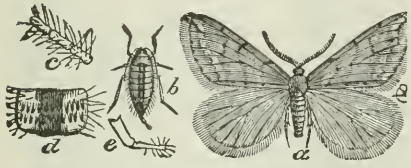
The moth appears about the time the trees are in bloom, and is one of the worst pests that attacks the apple.

Remedy —1. Feed to hogs the fallen apples which may contain larva. 2. Spray with Paris green, as directed for the treatment of the apple.

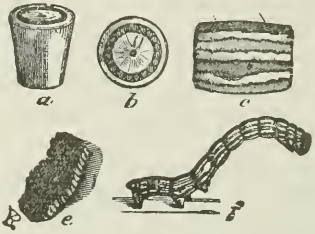


Codling moth : *a*, burrow ; *b*, entrance hole ; *d*, pupa ; *c*, larva ; *f*, moth.

Canker-Worms.—*Anisopteryx vernata* and *A. pometaria.* The spring canker worm was very common in 1896. Both worms are much alike, about an inch long, of a



Canker Moths : *a*, male ; *b*, female.



Canker Worm (*f*), and eggs (*a*, *b*, *c*.)

darkish brown color, slender, and move with a loop-like motion ; hence, sometimes called "measuring worms." They can drop from a tree by a silken thread.

A. vernata, the imago, appears in spring, the female is wingless, the male is ash-colored and has wings. *A. pometaria* is much the same, but the imago appears in the fall. The wingless females in both species crawl up the trunks to lay their eggs upon the twigs.

These insects attack the plum, cherry and apple. The accompanying cuts illustrate *A. vernata.*

Remedy.—The females may be trapped by putting a band of some adhesive material around the tree.

2. Paris green is an effective remedy, as directed in the treatment of the apple.

Oyster-shell Bark-louse —*Mytilaspis pomorum.* The insect appears in the form of a minute brown scale upon the bark of the apple tree, and, being much the same color, it is difficult to distinguish. The eggs are beneath the scales. They hatch about the end of May or the beginning of June. The young lice are almost invisible. They suck the ends of the young twigs, where they become fixed and continue to suck the juice from the twigs. Soon a scale forms over them. All under the scales, the shape of an oyster-shell, are females that lay their eggs under the scale. The scale of the male is more oblong, and is rarely seen.

Remedy.—1. In winter, or early spring, scrape off the rough bark from the trunk and large limbs, and rub in with a scrubbing-brush the following solution : One quart soft

soap, or one-quarter pound hard, in two quarts boiling water ; take seven parts of this and add one part carbolic acid ; then, when the young lice are moving (May or June) spray with kerosene emulsion, diluted with ten parts water.

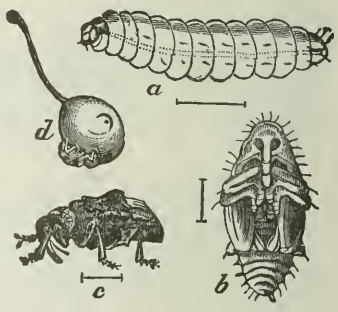
Pear-tree slug, various sizes.

Oyster-shell Bark-Louse.

Pear-tree Slug.—*Eriocampa cerasi.* This insect may be found attacking the pear, plum and cherry. The eggs are laid about June; the larva is about one-half inch in length and is thicker towards the head ; of a somewhat greenish-black color, and slimy. It has many legs. The pupa stage is spent in the ground and lasts two weeks. The imago is a small four-winged black fly. The slug feeds on the upper surface of the leaf. It was quite common during 1896.

Remedy.—Spraying with Paris green, hellebore or pyrethrum, in the common proportions.

Plum Curculio.—*Conotrachelus nenuphar.* There is no insect better known than this little beetle. The egg is deposited in the plum, where it hatches. The affected fruit soon falls to the ground, and the larvæ leave the plums and pass into the ground, where they remain for about six weeks. The imago is a small grayish beetle, one-fifth of an inch long, with a black lump on the middle of each wing-case. It has a curved snout and a stout body. The beetles hide themselves during the winter, in sheltered spots, and appear in spring about the time the trees are in bloom. This insect is also found upon the cherry, peach, and even apple.



Plum Curculio ; *a*, grub ; *b* and *c*, beetle ; *d*, egg laying on plum.

Remedy.—1. Jarring the tree morning and evening. At this time many beetles will drop and may be collected upon a sheet placed below.

2. Gather and destroy the affected plums, as they fall.

3. Spray Paris green as directed for the treatment of the plum, or Paris green may be applied alone (1 pound to 250 gallons of water, if the foliage is tender add 2 pound of lime). Spray once before the trees bloom, as soon as the foliage is well started, again as soon as the petals fall, and repeat about a week after.

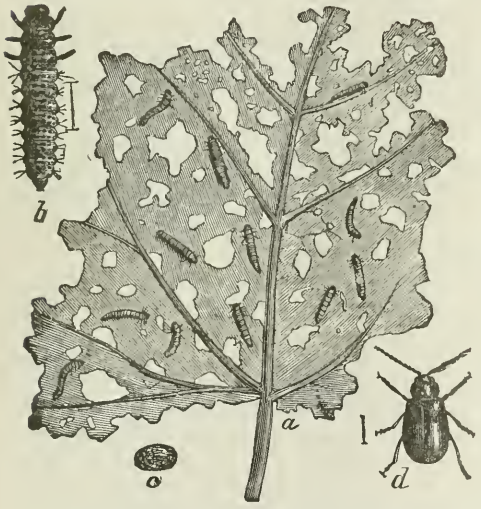
Currant Worm.—*Nematus ribesii.* This insect is very troublesome upon currant and gooseberry bushes. It lays its eggs early in the spring, on the under side of the leaves, in rows along the veins. These hatch in about ten days, and the young worms appear. The larvæ, when full grown, is about three-quarters of an inch in length, of a greenish color, with dark spots, and has many legs. It spins a brown cocoon, of paper-like texture, which is found sometimes on the ground among the dried leaves, or on the bush attached to the stems or leaves. This represents the pupa condition.

The imago appears in about two weeks after the pupa stage has been entered. The male is much smaller than the female, the body black, with some yellow spots above, while in the female the body is mostly yellow. Both have four membraneous wings. A second brood is of common occurrence.

Remedies.—1. Hellebore, one ounce in three gallons of water. It may also be applied as a dry powder, mixing it with three or four parts flour.

2. Paris green for the first brood ; but care must be taken not to continue this if the fruit is likely to be affected.

Currant Worms and the Saw Flies to which they change.



Grape-Vine Beetle.—*Haltica chalybea.* The eggs are deposited on the under side of the leaves. The larva is about one-third of an inch long, brownish, with several black dots on the body. The pupa condition is passed in the ground, and continues for about three weeks.

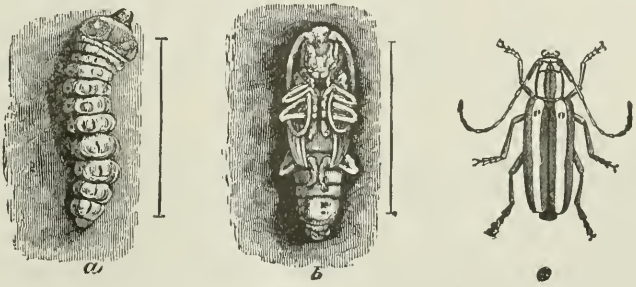
The imago is a small polished beetle, about one-fifth of an inch long. It passes the winter in sheltered spots, under leaves or around the roots, and is very destructive in the spring to the young buds, and afterwards, in the larval condition, to the leaves.

Remedies.—1. Paris green, three ounces to fifty gallons of water, or combined with Bordeaux mixture, as directed under treatment of the grape.

2. Dust pyrethrum powder upon the vines attacked.

3. Jarring the vines in the morning and collecting the beetles.

Round Headed Borer (*Saperda candida.*) The *eggs* are deposited about June, near the base of the trunk of the apple tree. The *larva* eats its way

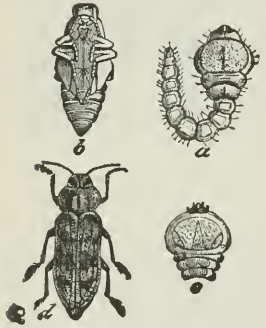


Round-headed Apple Tree Borer, *Saperda candida* : *a*, larva ; *b*, pupa ; *c*, beetle.

through the outer bark to the inner, and takes about three years to develop. It works in the sapwood, where it forms flat, shallow cavities, filled with saw-dust like castings. These are often seen on the bark, and indicate where the "borer" is at work. As it reaches maturity it cuts a passage upwards into the solid wood, and then curves towards the bark. In this channel it enters the *pupa* stage, about spring. When fully developed, it is an inch long, with a round head that distinguishes it from the flat-headed borer, which also affects the apple tree.

The *imago* is a slender beetle, one inch long, with two broad, whitish stripes on the wing-covers, and long, jointed antennæ. It appears about June.

Flat-Headed Borer (*Chrysobothris femorata*). This insect also attacks the trunk of the apple tree, but lays its *eggs* higher up the tree than the preceding one. The *larva* is pale yellow, an inch long, and has a well-marked flat head, much wider than the body. It is sometimes found even in the limbs, and is not so long in developing as the round-headed borer. It cuts flat channels in the sapwood, and sometimes girdles the tree. Castings and discolored bark indicate its presence. It finally bores into the solid wood, and becomes a *pupa* for about two weeks, and then emerges as an *imago* about half an inch long, somewhat flat, and of a greenish black color, with three raised lines on each wing cover. The legs and under side of the body present a coppery lustre.

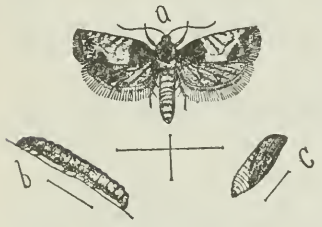


Flat-Headed Apple Tree Borer, *Chrysobothris femorata*, Fabr: *a*, larva; *b*, beetle.

Remedies.—1. Examine the trees in autumn, and where the saw-dust-like castings indicate the presence of the "borer," a stiff wire may be pushed in and the larva killed, or sometimes the larva can be cut out with a knife.

2. About the beginning of June apply the following mixture to the trunk of the tree: One pound of hard soap, or one quart of soft, in two gallons water; heat to boiling, and add one pint crude carbolic acid; make a second application in three weeks. This can be well done by using an old scrubbing-brush to rub it in.

11. Bud Moth (*Tmetocera ocellana*).—This insect is found attacking the buds upon the apple, and sometimes proves very injurious. The half-grown *larva* winters over, and appears in spring as a small brown caterpillar, just about the time the buds begin to open, and feeds upon them. It measures about half an inch when full grown. By rolling up one side of a leaf, and securely fastening it with silken threads, it forms a tube in which it enters the *pupa* stage, having lined the little chamber with a closely woven layer of silk. This condition lasts ten days. The *imago* is a small moth, resembling the codling moth in size and form. It is of an ash gray color. The front wings have a whitish gray band across the middle; the hind wings are a dusty brown. The expanded wings measure half an inch across.



Apple Tree Bud Moth, *Tmetocera ocellana*: *a*, moth; *b*, larva; *c*, pupa.

Remedy.—Paris green added to Bordeaux mixture, as directed for the treatment of the apple.

The Grape-leaf Hopper or Thrip (*Erythroneura vitis*). This small insect, about an eighth of an inch long, of a white color, marked by three dark bands, is sometimes troublesome on grape vines. They feed upon the juices of the plant, and are usually upon the underside of the leaves, where they are difficult to reach in spraying.

Remedy.—1. Remove fallen foliage at the close of the season, so that the insects cannot find shelter during the winter.

2. Spray with kerosene emulsion diluted with ten parts water, on the under side of the leaves, in the cooler part of the day.

Red Spider (*Tetranychus telarius*). The red spider is a very small insect—a true mite—and in some places is very destructive. It sucks the juices of the plants attacked, and causes the color of the leaf to change from green to a grayish-white. It flourishes in a dry atmosphere and in sunny places; shade and moisture are not favorable to its development.

Remedy.—Spray with clear water and keep the atmosphere about the plants moist.

2. Spraying with kerosene emulsion should also be followed by good results.

Plant Lice (*Aphidæ*). These minute, greenish insects affect the foliage of many plants by sucking the juice, and thus injure the leaves. They can be controlled by spraying with kerosene emulsion.

Injurious Fungi.

The following are among the most injurious fungi that affect the product of the garden and orchard. They can be readily controlled by the proper application of Bordeaux mixture, as directed.

The usual life history of a parasitic fungus is, that it arises from a spore which is microscopic; this germinates and gives rise to thread-like structures which penetrate the plant upon which the fungus grows and derives its nourishment. Upon these structures in time spores are produced, as new sources from which the fungus may develop and continue to be injurious to the vitality of the plants attacked.

Apple Spot or "Scab" (*Fusicladium dendriticum*). This fungus attacks the leaves and fruit of the apple, causing the "spots" on the fruit. The vegetative portion of the fungus is chiefly around the edge of the spots, where the spores are produced in great numbers.

Leaf Spot (*Entomosporium maculatum*). This disease attacks the pear, causing the leaves to show reddish spots with small pimples in the centre. When the fruit is attacked it cracks and appears stunted.

"Brown Rot" (*Monilia fructigena*). Attacks plums, cherries and peaches. The fruit affected becomes brownish at first, then shrivels and appears dried. In this condition it is termed "mummified," and is often seen upon the trees in that form. All "mummified" fruit should be gathered and burned, as they contain spores that will perpetuate the disease.

"Anthracnose" (*Gloeosporium venetum*). This fungus appears on the canes of raspberries as small round or oval patches, with a purple border, and sometimes upon the leaves as small yellowish spots with dark border. The affected canes should be cut out and destroyed by burning.

"Leaf-blight," "Sunburn" (*Sphærella fragariæ*). This disease produces very conspicuous spots on the upper surface of the leaves of the strawberry. The spots are reddish at first, then the centre becomes somewhat grayish.

"Powdery Mildew" (*Sphærotheca mors uvæ*). This mildew is the well-known blight on the gooseberry. It thrives in a warm, dry atmosphere, and sometimes is very destructive. At first the berries are covered with a grayish substance, and later assume a brown color.

"Potato Blight" (*Phytophthora infestans*). This fungus attacks the potato, commencing with the leaves and finally affecting the tubers.

VITALITY OF THE COMMON BINDWEED (*Convolvulus arvensis*).

The series of experiments with this weed, begun in 1896, was continued this season, but with indifferent results, no satisfactory method of dealing with the pest having been found. The plot, which had been covered with salt in May, 1896, was observed on May 11th, 1897, to have some plants springing through, especially near the edges. Weekly hoeings of the other plots and digging around to the depth of one foot failed to overcome the trouble.

On May 12th a test was made of the vitality of small sections of the root. A plot of ground two feet square, infested with the weed, was dug and the soil removed and carefully sifted. There were obtained 142 feet of main root one-seventh to three-eights of an inch in thickness and 120 rootlets of an average length of three inches. The total weight of roots was $13\frac{1}{4}$ ounces. The main root was cut into half-inch, one-inch and two-inch pieces and these were sown in pots. There were ten half-inch pieces, five one-inch pieces, and five two-inch pieces of the root, also five two-inch pieces of the stem; but none of them grew. On July 2nd, a similar experiment was tried, when it was found that out of five pieces of root, each five inches in length, two grew.

A piece of root ten inches in length was exposed to the sun for a short time and then planted, and it did not grow. From this it would appear that exposure to the sun destroys the vitality of the root.

BORDEAUX MIXTURE AS AN INSECTICIDE.

The experiments with Bordeaux mixture as an insecticide were a continuation of those reported upon in 1896. Twenty-five gooseberry bushes were selected for the work. Every fifth one was left unsprayed while the others were sprayed with Bordeaux mixture, made from four pounds of copper sulphate, four pound of lime and forty gallons of water.

First application, May 6th.

Second application, May 13th. No worms were found. On May 19th, a few worms were seen on the lower side of some of the leaves. They had eaten from the under surface and interior of the leaf, avoiding the poison, and had thus skeletonized a number of leaves.

Third application, May 21st. On May 28th only a few worms were found on the sprayed bushes; on the unsprayed the worms had done considerable damage. On May 31st, these appearances were more marked, but on the sprayed bushes a few worms were observed on the young shoots which had lately come into leaf.

Further experiments with the application of lime water gave results similar to those with the Bordeaux mixture.

Tent caterpillars were sprayed with Bordeaux mixture and with Bordeaux mixture and Paris green combined. In both cases a blackening of the larvæ and death resulted.

These last experiments, though incomplete, seem to indicate that lime water is as efficacious as Bordeaux mixture, and that there is, perhaps, a slight advantage to be gained from the addition of Paris green.

I wish to bear testimony here to the great assistance rendered me by the Fellow in Biology, Mr. T. F. Paterson, who, unfortunately, resigned his position in September to accept one which in his opinion offered a better field for the exercise of his energies. Mr. J. C. Macdonald, B.S.A., of '97, has been appointed in his place, and already his work has proved him worthy of the appointment.

All of which is respectfully submitted,

J. HOYES PANTON,

Professor of Biology and Geology.

Guelph, November 24th, 1897.

PART IV.

REPORT OF

THE CHEMISTRY DEPARTMENT.

To the President of the Ontario Agricultural College :

SIR,—Owing to Prof. Shuttleworth's absence in Germany, it devolves upon me to write the report of the Chemical Department for this year.

During Prof. Shuttleworth's absence Mr. W. A. Kennedy, a graduate of the college, has been assisting with both the teaching and analytical work of the department ; and much of the matter herein reported is due to the valuable services he has rendered since his appointment.

A year's work in the new laboratory has shown it to be admirably adapted to the requirements of our work. The class-room and preparation room adjoining are far superior to those in the old building, and afford greatly increased facilities for the demonstration of the principles of chemistry. The qualitative and quantitative laboratories are now fully equipped, making it possible to do much more efficient work. A separate room for station analyses has greatly facilitated the investigation work of the department.

Some slight changes have been made in the work of this department. Owing to a change in the options of the Third Year, the Agricultural and Horticultural specialists have now to take a course in the chemistry of Insecticides and Fungicides, and a course in the chemistry of Dairying has been added to the work of the Dairy specialists. In addition to this, the agricultural specialists have now to take honours in Agricultural and Animal Chemistry, and the dairy specialists in Animal Chemistry ; and the increased laboratory accommodation makes it possible to give the Second Year students more practical work than heretofore.

WORK FOR OTHER DEPARTMENTS.

Agricultural Department : In conjunction with Mr. Day's experiments to ascertain the comparative feeding value of sweet and sour whey, we determined the protein and sugar in a number of samples of whey. The results of this work will be found in the report of the Agriculturist.

Dairy Department : At Prof. Dean's request we analyzed a number of samples of whey with a view to determining at what stage in the process of the manufacture of cheese the casein is lost ; also, if more casein is found in the whey from rich milk than in that from poor milk, and at what stage, or stages, it is lost. For this purpose, the casein was determined in a number of samples of rich and poor milk taken at four different stages in the process of manufacture, viz., before dipping, after dipping, after milling, and after salting.

We also determined the moisture of forty samples of butter. The results of this work will appear in the report of the Professor of Dairying.

Five samples of water and one sample of clay were analyzed during the year, but the results are not of sufficient importance to publish here.

Analyses of Sugar Beets.

At the request of the Minister of Agriculture and the Directors of the Owen Sound Sugar Manufacturing Co., we analyzed, during the latter part of October, forty samples of sugar beets. The results of which are here given.

The Owen Sound Sugar Manufacturing Co. had, during the last season, about 400 farmers growing sugar beets. The plots varied from one-tenth to one and one-half acres in area, and were all sown with seed imported from Germany. To determine the quality of the beets grown, representative samples were selected, a number of which were sent to Thomas Macfarlane, Analyst of the Dominion Inland Revenue Department, Ottawa, and part to our laboratory. The beets arrived here in a good fresh condition and were at once analyzed. The results of the analyses are given in the table below.

No.	Name.	No. of roots	Average weight in pounds.	Analysis of juice.			Remarks.
				Solids.	Sugar.	Purity.	
1	Anderson, D.	5	1.50	18.96	14.6	77.01	Long, pointed and medium.
2	Tomsett, Wm.	5	1.35	17.71	14.1	79.61	Stout, short, medium.
3	Cann, Jno	6	.67	18.40	16.4	88.04	Short, stout and small.
4	Millard, A.	6	1.61	17.70	14.5	81.35	Large and rather short.
5	Sprag, L.	6	1.06	19.47	15.7	80.63	Slender and of medium length.
6	Simms, W. W.	6	1.01	19.40	15.7	80.92	Long and of medium thickness.
7	Power, Jas.	6	1.50	19.07	14.9	78.12	Short and rather stout.
8	McLain, D.	5	1.34	19.36	15.9	81 91	Of medium length.
9	McGregor, Wm.	6	1.31	18.92	15 31	80.86	Medium to large.
10	Forrest, D.	6	1.12	19.00	15.9	83.68	Slender and of medium length.
11	M'f'g Co., O.S.S.	6	1.19	17.97	13.5	75.12	Small, short and stout.
12	Michael, G.	5	1.07	18 20	15.5	85.16	Slender and small.
13	Bailey, Wm.	6	1.37	19.40	15.4	79.38	Long and of medium thickness.
14	Frost, T.	4	1.41	19.32	15.3	79.19	Long, slender roots.
15	Walters, J.	6	1.26	18 60	15.6	83.87	Of medium length, slender.
16	Tory, Arthur.	6	1.51	20.00	17.0	85.00	Short and of medium thickness.
18	McIntosh, R. J.	5	1.12	17.70	14.6	82.49	Small and of medium length.
20	Cook, Moses	4	1.44	18.56	15.00	80.81	Large and short.
20	Cook, Moses	4	1.88	17.60	14.1	80 11	Short and quite stout.
21	McGregor, I.	5	.86	18.70	15 9	85 02	Very small.
22	Morrison, —	6	1.95	18.69	15.1	80.79	Large, stout and long.
23	Lang, H. C.	6	2.31	19.90	15.9	79.89	Very large and long.
24	McNabb, Geo.	8	1.06	16.81	13.6	80.90	Of medium length.
25	Vail R.	6	1.56	15.81	10.8	68.31	Quite large, long and slender.
27	Nesbit, Wm.	6	.88	19.80	16.0	80.80	Small and short.
28	Ried, N	6	.76	19.97	16.5	82 62	Very small and lengthy.
29	Duff, T.	7	1.59	18.60	14 5	77.90	Thick and of medium length.
30	Kennedy, H. C.	6	1.00	19 30	16.2	83 93	Long and slender.
31	Dinsmore, J.	6	2.51	19.20	15.4	80.20	Large, very thick.
32	Emry, J.	6	1.52	18.10	15.7	86.74	Lengthy, medium and stout.
33	Herman, A. A.	5	2.51	18.80	14.8	78.72	Very stout, of medium length.
34	McKay, —.	6	1 67	18.76	15.4	82.08	Of medium length and stout.
35	Quinn, Jas.	6	1.54	17.20	10.7	62.20	Thick and of medium length.
36	Martiondale, G.	5	1.87	19.60	16.0	81.63	Short and stout.
37	Pacey, E.	2	4.51	16.91	12.0	70.90	Very large.
38	Davidson, D.	6	1.64	18.70	15.0	80.21	Of medium length and stout.
39	McKenzie, J.	6	1.47	17.70	13.2	74.57	Thick and short.
40	Whinfield, J.	5	1.92	18.00	10.7	59.44	Thick and of medium length.
41	M'f'g Co., O.S.S.	5	1.34	17.90	14.0	78.21	Thick and of medium length.
42	Magwood, —	6	1.61	18.70	14.8	79.14	Of medium length and stout.
	Average		1.52	18.81	14.8	79.66	

The results of the analyses show the beets to be of a very good quality. The percentage of sugar in samples No. 25, 35 and 40 is low, and the co-efficient of purity is very low. These three samples have naturally reduced the average per cent of sugar and the co-efficient of purity in the forty samples analyzed. The average, however, still compares very favorably with the standard proposed by Dr. Wiley, in Bulletin No. 30, Division of Chemistry, United States Department of Agriculture. Dr. Wiley gives the following as a standard of comparison:

"I would say that a typical sugar beet for sugar-making purposes should weigh 600 grammes, (1⅓ lbs.), contain fourteen per cent. sugar, and have a purity of at least eighty." Continuing, Dr. Wiley says, "With such raw material at his disposal in sufficient quantity, the manufacturer cannot fail of success, provided he be supplied with the latest and most improved forms of machinery."

During the year 1890, C. C. James, Deputy Minister of Agriculture for Ontario, then Professor of Chemistry in this institution, and Mr. Wilfred Skaife, B.A., Sc., analyzed a large number of samples of sugar beets gathered from different parts of the Province. The results of their work were published in the College Report of that year. Later, sugar beets were sent here from the Leamington, Niagara and Owen Sound districts. The analyses of these, with some varieties grown by Mr. Zavitz on the experimental plots of the College Farm, are given in the report of this institution for 1895. In most cases the beets were grown by inexperienced beet growers and, as a result, were very large, with a considerable portion grown above ground. Notwithstanding this fact, it is evident from the average of these analyses, which are given in the table below, that beets containing a fairly high percentage of sugar and high co-efficient of purity can be grown in Ontario.

Average of the analyses made in 1890, 1895 and 1897.

Year.	Average weight of beet.	Analysis of juice.		
		Solids.	Sugar.	Purity.
	lbs.			
1890	1.40	17.12	13.58	79.32
1895	3.75	15.90	14.34	90.20
1897	1.52	18.81	14.80	79.66

With the present degree of perfection in the production of beet seed rich in sugar, and with the knowledge of the scientific principles of agriculture which should guide the beet growers, it is undoubtedly possible to increase the percentage of sugar and improve the co-efficient of purity.

Composition of the Ashes of Different Woods.

The value of wood ashes lies in the fact that they are the mineral remains of the plant. The growing plant gathers all its mineral constituents from the soil in which it grows, and these, not being combustible, are left as an ash when the plant is burned. Consequently it must contain all the mineral constituents that are necessary for growth. Of these essential constituents, potash and phosphoric acid are the most important, not only because they are taken up in comparatively large quantities by the growing plant and then sold and taken from the parm in the form of grain and beef, but also because of the fact that average Ontario soils do not contain them any too abundantly. Our soils, particularly for the growth of certain crops, are beginning to require potash and phosphoric acid, and these are contained in an available form in wood ashes. Ashes also con-

tain large quantities of lime, which acts physically in making sands firmer and clays more friable, and chemically in rendering available for plant growth the potash and phosphoric acid held in certain comparatively insoluble constituents of the soil. Wood ashes therefore supply both directly and indirectly these two valuable constituents, potash and phosphoric acid.

The fact that the soil in many sections of the Province is decreasing in fertility, combined with low prices for produce, has made many farmers and orchardists look about for some cheap form of fertilizer. Many letters have been received by the Department asking for the composition of the ash from various woods, and to supply this growing demand for information regarding the amount of potash and phosphoric acid contained in ashes, we have, during the last two years, made a considerable number of analyses of the ashes from different kinds of wood. The report from this department for last year contains an account of the work done, and the work of collecting and analyzing the ashes was continued throughout this last year; so that we now have the analyses of a fairly complete list of the ashes of the common Ontario forest trees; and in addition, some work has been done on the ashes from fruit trees and small fruits.

The method of preparing a sample of ashes for analysis was the same as that reported last year. "The samples of ash of the different woods and small fruits were obtained by carefully reducing the whole or portions of the tree or bush to a comparatively white, anhydrous ash which was tightly bottled and labelled for analysis. Each sample, therefore, was true to representation."

As commercial ashes are usually obtained from the burning of cordwood, samples for analyses were, in most cases, taken from the trunks and older boughs of trees. From fruit trees, samples were obtained in the same way, while in the case of the small fruits, only the canes were burned.

The figures given in table below express the percentage of the various constituents contained in the dry ash. The nitrogen was, of course, dissipated in burning.

Varieties.	Potash.	Soda.	Phosphoric acid.	Lime.	Magnesia.	Oxide of iron.	Sulphuric acid.
Iron wood	8.15	4.95	1.71	42.61	5.63	.50	.79
Maple (hard)	9.31		2.03	45.24			1.24
Hickory	9.17	4.35	2.12	44.43	6.49	.24	.56
Beech	7.58	4 09	1.39	41.21	6.16	.30	traces
Maple (soft)	9.52		1.29	41.97	5.38	.12	1.39
Rock Elm	6.66	2.690	.71	49.52	2 64	.25	.59
Swamp Elm	35.37	traces	.45	23.64	6.48	.19	traces
Birch	8.58	1.47	1.81	37.10	5.65	.39	1.90
Oak, red	5.75	1.00	.92	48.97	2.45	.37	traces
Ork, white	9.39	2.88	1.69	43.54	4.39	.25	.91
Hemlock	8.73	3.88	2 76	45.83	4.78	.36	.98
Ash, black	25.30	4.22	1.20	49.04	7.42	.22	.71
Ash, white	16.88	12.90	.93	37.14	3 98	.32	.67
Pine	11.22	8.44	4.03	20.28	6.53	1.52	5.85
Cedar	3.30	3.08	.98	49.06	2.49	.70	.77
Spruce	8.98	.15	4 00	25.82	4.04	1.52	2.61
Willow	9.59	1.51	2.16	35 55	3 21	.55	2.38
Balsam	17.53	1.54	2.39	22.63	4.04	1.08	.88
Basswood	9.39	.10	5.28	33.42	4·28	.44	traces
Poplar	10.42		1.18	28.73	3.64	1.43	1.67
Butternut	3.99	2.27	1.76	44.95	5.22	.45	.42
Walnut	4.62		.70	35.93	5.35	3.42	1.51
Mixed wood ashes.							
No. 1	5.53		1.34				
" 2	4.55		3.57				
" 3	5.14		1.32	36.45			
" 4	4.98		1.45	33.39			
" 5	13.40		1.18	28.73	3.64	1.43	1.67

Percentage of various constituents.—*Concluded.*

Varieties.	Potash.	Soda.	Phosphoric acid.	Lime.	Magnesia.	Oxide of iron.	Sulphuric acid.
Ashes from fruit trees.							
Apple	4.84	4.02	1.81	44.93	3.28	.70	.41
Cherry	5.28	.92	1.90	46 93	3.00	1.29	.79
Pear	9.73	traces	.81	42.07	3.10	.39	.93
Plumb	4.81	traces	2.49	48.39	1.89	.22	.63
Peach	6 98	.27	3.43	41 49	3.18	.30	.73
Quince	6.32	1.76	2.29	48.22	3.17	.33	1.07
Ashes from small fruits.							
Blackberry	10.34	.....	7 26	35.14	.....	....	1.24
Strawberry (whole plant)	15.90	.....	9.17	17.44	.....	.....	4 85
Gooseberry	13.07	.49	6.99	20.64	2.61	1.08	2.01
Raspberry	7.90	.81	6.54	23 03	8.54	1.19	2.60
Grape vine (whole vine)	8 33	....	3 37	26.74	....	.....	1.39
Grape vine, cuttings	12.21	7 67	6.31	21.39	9.96	.44	2.64
Hard coal, No. 1	traces	traces	.159	traces	traces	5.329	.415
Hard coal, No. 1	traces	traces	1.12	1.49	traces	2.60	.304
Garbage ash	1.27	2.31	1.66	8.13	1.17	5.307	1 400

The fact that these ashes were pure and prepared from the wood only explains why the percentages of mineral constituents are so much higher than those found in the average ashes in the market, which are as follows for unleached ashes : Moisture, 12 50 ; potash, 5.25 ; phosphoric acid, 1.70 ; lime, 34, and magnesia, 3.40 per cent. These averages correspond very closely with those of the mixed ashes given in the table above. Ashes which have been subjected to leaching show a reduced percentage of potash and an increased percentage of moisture, but otherwise remain the same. The average percentage composition of leached ashes, as compiled from analyses by the Massachusetts and Connecticut stations, is as follows : Moisture, 30.22 ; potash, 1 27 ; phosphoric acid, 1.51 ; lime, 28.08, and magnesia, 2.66 per cent. Limekiln ashes differ in composition from the leached ashes, principally in their lower percentage of moisture and higher percentage of lime. The average composition, as compiled from a large number of analyses, is as follows : Moisture, 15.45 ; potash, 1.20; phosphoric acid, 1.14 ; lime, 48.50, and magnesia, 2 60 per cent.

Reference to potash column in table of analyses shows clearly why ash buyers are anxious to get black ash and swamp elm ashes. At the same time, it must not be forgotten that these ashes are very light and bulky ; therefore, although they are so high in percentage composition, there may be as much potash in one measure bushel of maple as there is in the same bulk of swamp elm ash. Basswood and pine contain very large amounts of phosphoric acid. Cedar is the poorest ash in the list. The ash of the fruit trees is very similar in composition to that of the forest trees. In that of the small fruits the percentages of potash and phosphoric acid are noticeably high, particularly that of the phosphoric acid. While this alone cannot be taken as a definite guide as to the proportion of the fertilizing constituents necessary for these plants, it certainly indicates that they will be benefited by a liberal supply of phosphoric acid. The figures bear out the idea that hard coal ashes do not contain much that has a fertilizing value. The garbage ash was from the Toronto crematory. Remembering the many sources of these ashes, it is evident that their composition will be very variable, and for that reason buyers should not draw hasty conclusions from any single analysis.

It is a well known fact that the ash from different parts of the same plant differs in composition, that from the young and growing parts being richest in potash. It is also true that the same kinds of plants grown upon different soils vary widely in the amount

of potash and phosphoric acid which they contain. For these reasons we do not claim that the figures given in the table represent a constant composition; that is, that maple ashes always contain exactly 9.3 per cent. of potash and 2.03 per cent. of phosphoric acid, but that they are a general guide to the amount of the fertilizing constituents contained in an ash. For instance, a person may have a quantity of maple ashes on hand, or may wish to buy a pile that has been made largely from maple wood, and he will be safe in assuming that if they have been obtained from body wood, are dry, and free from dirt, 100 lbs. of the ash will contain about nine lbs. of potash and two lbs. of phosphoric acid.

But, as ordinarily obtained, ashes contain impurities, such as charcoal, sand, and more or less moisture. This usually amounts to fifteen per cent., and will of necessity reduce the percentage composition correspondingly.

A comparison between the value of wood ashes, based on the prices paid for artificial fertilizers, and what the producer actually receives for them, brings out some interesting figures. In commercial fertilizers, potash and phosphoric acid cost, on an average, about five cents per pound. We have seen that the ordinary ashes in the market contain 5 25 per cent. of potash, and 1.70 per cent. of phosphoric acid, or 105 lbs. potash and 34 lbs. of phosphoric acid per ton, which at five cents a pound would amount to $6.95, or allowing fifty bushels to the ton, 13.9 cents per bushel. At the same time, it is a well-known fact that in many parts of the Province ashes can be bought from the producer at from three to five cents per bushel. These figures show a difference of ten cents a bushel between the value of ashes and the price at which they are often sold.

It has been stated by those interested in the sale of potash fertilizers, that the potash in wood ashes is not all in an available form for plant use. To ascertain what truth there is in the statement, a number of ashes were treated according to Dr. Dyer's method for determining the availability of plant food. Plants exude an acid from their roots which has a solvent action on the constituents of the soil, and by carefully conducted experiments Dr. Dyer has determined that this acid root sap corresponds, so far as its solvent action is concerned, to a one per cent. solution of crystallized citric acid. If, then, the ash be treated with this solution, potash—corresponding to the amount that would be dissolved by the acid sap—will be brought into solution Nine ashes were treated in this way, and the amounts of potash, phosphoric acid and lime in solution determined. The results are given in the table below.

Table showing the availability of potash, phosphoric acid and lime, in a number of of samples of wood ashes:

Ash.	Potash.			Phosphoric acid.			Lime.		
	Pounds in 100 lbs. of ash.	Pounds soluble in a 1 per cent. solution of citric acid.	Per cent. of potash available.	Pounds in 100 lbs. ash.	Pounds soluble in a 1 per cent. solution of citric acid.	Per cent of phosphoric acid available.	Pounds in 100 lbs. ash.	Pounds soluble in a 1 per cent. solution of citric acid.	Per cent. of lime available.
White Oak	9.39	7.64	82.33	1.69	Traces	.....	43.54	3.60	8.27
Birch	8.58	6.82	79.48	1.81	Traces	.....	37.10	3.67	9.89
No. 5, mixed ash	13.40	12.72	94.92	1.18	.120	10.169	28.73	3.27	11.38
Walnut	4.62	4.61	99.87	.70	.109	15.57	35.93	2 57	7.15
Red Oak	5.75	4.72	82 09	.92	Traces	.....	48 97	2.24	4.57
Poplar	10.42	8.78	84.26	1.18	.034	2.88	28 73	3.90	13.50
White Ash	16.88	15.24	90.20	.93	.096	10.32	37.14	4.47	12.03
Butternut	3.99	3.56	89.22	1.76	Traces	.....	44.95	3.52	7.82
Willow	9.59	9.19	85.40	2.16	.144	6.66	35.55	2.99	8.41

Nearly 80 per cent. of the total potash of the birch ash was found in the solution and practically the whole of that of the walnut ash. An average of the nine samples experimented with shows that 87.5 per cent. of the total potash of the different ashes was soluble in the citric acid solution. According to this method of determining availability of plant food, all but 12.5 per cent. of the potash would be in a form in which growing plants could make use of it at once. Smaller amounts of the phosphoric acid and lime appeared to be soluble. In some cases, the amount of phosphoric acid was so small that it was not determined but simply entered as "traces."

It is evident from the above :

1. That wood ashes contain varying, but comparatively large, amounts of potash.
2. That the potash is very nearly all in a form immediately available for plant use.
3. That the price received for ashes by the producer does not nearly represent their value as a fertilizer.

The composition of Hay as affected by maturity.

Under the above heading, the report of this Department of last year contains the following : "To obtain something definite regarding the time when the most profitable degree of maturity is reached, six plots, one rod square, were set apart in our experimental grounds in 1895. Three were seeded down with common red clover and three with timothy. All the circumstances were favorable for the production of even and uniform crops. Each of the three plots of clover and of the three plots of timothy was cut on a different date, so that each cutting of clover and of timothy represents a distinct stage in the maturity of the respective crops. The produce of every plot immediately after being cut was weighed and cured as hay in the usual way, but without exposing to rain or dew. This cured hay was then again weighed, and a sample taken for chemical analysis." The above outlined experiment was repeated this year, the cuttings of clover and timothy being taken from the same plots as last year.

Pounds of dry matter per acre at the time of cutting :

Hay.	Dates of cutting.		Pounds of dry matter per acre.	
	1896.	1897.	1896.	1897.
Clover.				
1st cutting	June 1st	June 14th	2,948.34	2,682.21
2nd cutting	" 14th	" 28th	4,440.67	4,281.49
3rd cutting	July 7th	July 15th	6,439.36	4,462.80
Timothy.				
1st cutting	June 15th	June 25th	5,460.76	6,369.78
2nd cutting	July 7th	July 9th	9,114.91	7,751.42
3rd cutting	" 23rd	" 25th	8,537.96	7,537.55

As nearly as possible the different cuttings were made when the plant had reached the same stage of maturity as when the cuttings were made last year. This, for the first cutting of clover, was when the first blossom was just appearing ; the second was made when one-third of the total number of blossoms had turned brown ; and the third cutting when the heads were all browned or dead. The three cuttings of timothy were made when the heads were beginning to appear ; when the first blossom had just fallen ; and when the second blossom had fallen and the seeds were well formed. This year, on account of the cold wet weather in the month of May, the first cuttings were made two weeks later than the corresponding cuttings of last year.

The figures in the above table show a continual growth in the clover after the first cutting in both 1896 and 1897, while with the timothy in both years there is an increase to the second cutting, but a decrease between the second and third.

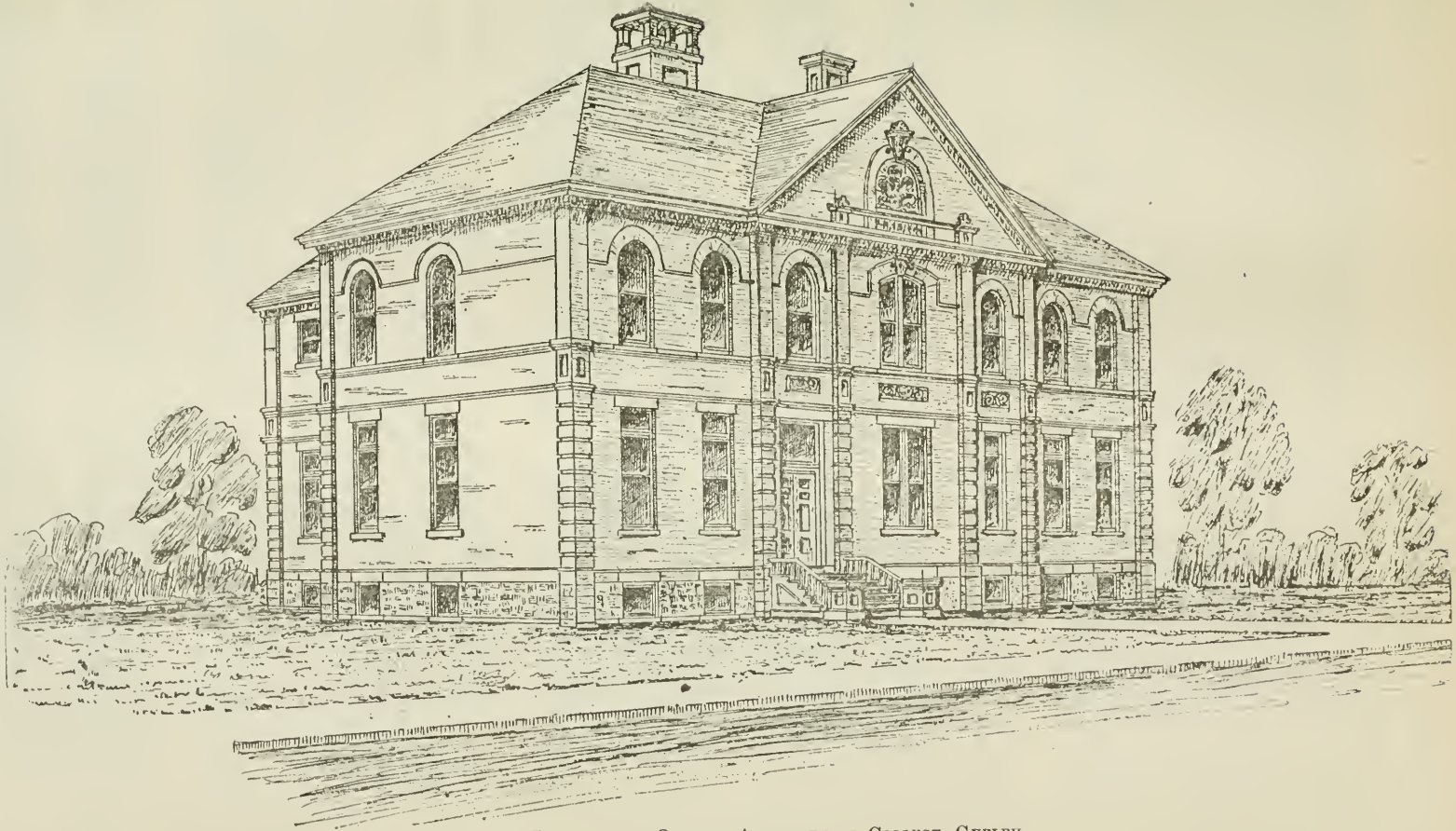
Although after a certain stage in the maturity of the crop, growth continues, the deterioration in composition is very rapid. The table below gives the percentage composition of clover and timothy cut at different stages of maturity in 1897, an average of the analyses of 1896 and 1897, and an average of the American analyses of cuttings made at a stage of maturity corresponding very closely with our own. It is interesting to note the close resemblance in composition of the different cuttings as given in the American analyses and in our own.

Composition of hay harvested at different dates.

Dates of cutting.	In fresh material.							Calculated to water-free substance.					
	Water.	Ash.	Crude protein.	Crude fibre.	Nitrogen-free extract.	Crude fat.	Amides.	Ash.	Crude protein.	Crude fibre.	Nitrogen-free extract.	Crude fat.	Amides.
						Clover.							
1897—													
June 14th	87.01	1.08	2.29	3.13	5.81	0.68	0 42	8.31	17.64	24.12	44.69	5.24	3.22
" 28th	77.45	1.87	3.46	5.85	10.08	1.29	0 61	8.60	15.92	26 92	42 65	5.92	2.82
July 15th	77.23	1.59	2.70	7.37	9 67	1.44	0.50	6.98	11 86	32.37	42.46	6.33	2.18
Averages of 1896-97	82.66	1.59	3.08	3.80	7.63	0.94	0.50	8.99	17.76	22.35	44.16	5.41	2.94
	77 00	1.95	3.30	5.93	10.03	1.30	0.78	8.15	14.68	26.29	42.60	5.75	3.45
	75.28	2.01	2.67	7.84	10.39	1.46	0.48	8.50	10.90	31.80	42.25	5.93	2.16
Averages of available American analyses	61.21	3.24	5.54	10 76	18.59	0.66	....	8.30	14.30	27.80	47.90	1.70	....
	47.13	4.04	7.13	14.69	25.75	1.26	....	7.70	13.50	27.80	48.60	2.40	....
	61.05	2.54	4.03	12.36	19.08	0.94	....	6.50	10.40	31 80	48.90	2.40	....
						Timothy.							
1897—													
June 25th	70.73	1.98	2.73	9 79	13.59	1.18	0.79	6.76	9.32	33.46	46.43	4.03	2.70
July 9th	62.31	2.38	2.22	14.13	19.97	1.33	0.05	5.95	5.54	35.30	49.88	3.33	0.13
" 25th	61.71	1.97	1.70	13.15	20.11	1.36	0.01	5.15	4.44	34 35	52.52	3.55	0.03
Averages of 1896-97	73.00	1.95	1.87	8.77	12.55	1.17	0.56	7.28	8.65	32.41	46.50	4.38	2.02
	63 46	2.33	2.01	12.90	19.03	1.37	0.09	6.19	5.31	34.15	50.50	3.67	0.24
	59.68	2.57	1.91	13.70	20.77	1.25	0 08	6.82	4.72	33.99	51.55	3.24	0.20
Averages of American analyses	61.72	1.80	3.66	12.65	19.42	0.75	....	4.70	9.60	33.00	50.80	1.90	....
	66 83	1.44	2.36	11.04	17.68	0.65	....	4.40	7.10	33 30	53.20	2 00	....
	55.29	1.63	3 04	15.84	23.32	0.88	....	3.70	6.80	35.40	52.10	2.00	....

Definitions. *Ash* is the part of the fodder which remains unconsumed by burning to whiteness at the lowest possible red heat. *Crude Protein* is the muscle formers collectively. *Crude Fat* is a mixture of oils, wax, coloring matter, etc. Linseed oil is a common example. *Crude Fibre* is the woody portion of fodder. *Nitrogen Free Extract* is a mixture of substances commonly called carbohydrates. Starch and sugar are examples. *Nutrient* is any substance that nourishes; fat, protein, starch, etc., are nutrients.

The above table of composition shows a decrease in percentage of water, and therefore in the succulency of the material as maturity approaches. Crude protein decreases considerably with maturity, while the woody portion or crude fibre increases very rapidly. The crude protein is the most valuable part of the food, and the crude fibre that part which is of the least value. It must follow therefore that both clover and timothy decrease in food value as they approach maturity.



Chemical Laboratory—Ontario Agricultural College, Guelph.

Chemical analysis alone does not tell the nutritive value of a food, but the chemical composition, taken in connection with actual digestion tests, indicates quite accurately what portion of the food may be available for the nutrition of the animal, for it is only the part of the food which is digested that has any nutritive value. A digestion experiment is usually made as follows: Selected animals are fed with the kind or kinds of feeding stuffs to be tested. The feeding stuffs are carefully analyzed. A weighed portion is fed, care being taken to see that none is wasted. In this way the exact weights of protein, fat, fibre, nitrogen free extract and ash eaten, are ascertained. The solid excrement of the animal contains the undigested residues. This is carefully collected, dried, weighed and analyzed, and the amounts of undigested protein, fat, fibre, nitrogen free extract and ash contained in it are found. The difference between the amounts found in the undigested residues and the amounts contained in the food eaten is taken as a measure of the amounts of the various nutrients which have been digested and assimilated by the animal.

While such an experiment seems comparatively simple, it is surrounded by a number of difficulties which make the work laborious and tends to make the results somewhat uncertain.

The results of digestion experiments in Germany and elsewhere warrant the following general conclusions upon the influence of species, breed, etc., upon digestibility of feeding stuffs.

Influence of Kind of Animals. All ruminants, such as cows, oxen, sheep, and goats, seem to digest practically the same amount of protein, fat, nitrogen free extract, and fibre from the same kind of food. In general, horses digest less of the food constituents than do ruminants. This is especially true of the fibre and fat in the hays and grasses.

Influence of Breed. The influence of breed upon digestibility has been studied with sheep, but no difference due to breed has been found. In general, it is probably true that different breeds of animals of the same species digest practically the same amounts of nutrients of the same foods.

Influence of Individual. Individual differences have always been observed. The variation is quite wide, and on this account the results with the influence of kinds and breeds of animals are somewhat obscured, variations in amounts digested by different individual animals of the same species and breed being wider than most variations in different species.

Influence of Age. The few experiments conducted (principally with sheep) indicate very little difference, if any, due to age.

From the above it will be seen that differences due to age, breed and species of ruminants are slight. The digestibility of a fodder by a sheep can be taken as a tolerably correct measure of its digestibility by a cow or steer.

During the last summer we conducted one digestion experiment with each of the different cuttings of clover and timothy; and as sheep are much easier experimented with than larger animals, they were used in this test.

The pen for each animal was about five feet square. The mangers were arranged on the outside of the pen, with stanchions on the inside in which the animal's head was placed while feeding, thus effectually preventing any loss of food by scattering. A rubber-lined bag for collecting the fœces was attached to the animal by means of a suitable harness.

Each experiment lasted twelve days. The first seven days were given to preliminary feeding, during which the fœces were not collected. The whole of the fœces was collected during the last five days, and was removed twice daily from the bags and placed on the drying apparatus.

To give full particulars of each experiment would be adding an immense amount of data which would be of very little value to the general reader. We, therefore, come at once to the results of the experiments. The following table gives the number of pounds

of each constituent digested, for every 100 pounds fed. There was not sufficient hay from the first cutting of clover to feed the sheep the full number of days of the experiment, consequently, although it was worked out, it is not reported.

Pounds of each constituent digested per 100 pounds fed.

	Dry matter.	Protein.	Fat.	Fibre.	Nitrogen-free extract.
Clover—					
2nd cutting	57.35	61.48	72.03	44.30	71.10
3rd "	55.76	54.18	74.23	44.30	68.67
American determinations—					
Just before blossoming		73.00	62 00	55.00	76.00
In full blossom		67.00	63.00	48.00	70.00
Just out of blossom		59.00	45.00	39.00	71.00
Timothy—					
1st cutting	57.21	53.58	65.08	59.03	59.29
2nd "	54.13	40.36	47.50	54.20	58.43
3rd "	45.13	22.63	65.07	38.99	53.11
American determinations—					
Full bloom		57.00	56.00	59.00	64.00
Late cut		45.00	51.00	48.00	61.00

It has been stated that individual animals vary in the amount they will digest of a given fodder. For this reason and for the fact that but one experiment was conducted in each case, we do not wish to place too much emphasis on the digestion coefficients given above. The results of some American digestion experiments of clover and timothy cut at different dates are placed in the tables. Both these and our own work show clearly a decrease in digestibility as the plant approaches maturity. The clover and timothy, therefore, not only deteriorate in composition with maturity but also in digestibility. Apparently the younger the plant, the richer it is in valuable constituents and the more digestible are these constituents. But as the plant matures the absolute amount of these constituents increase. Therefore the object in hay-making should be to cut at such a stage of maturity that the largest possible amount of the valuable constituents can be got without too great a decrease in digestibility. It will be seen in both our own work and the American determinations that there is a very rapid decrease in digestibility after full bloom is reached. Hence it would appear that this is about the time when there is the largest amount of digestible nutrients present. This is borne out by the tables given below.

Pounds of Dry Matter Digested per Acre.

Dates of cutting.	Pounds of dry matter digested per acre.
Clover.	
2nd cutting, June 28th	2,455.43
3rd do July 15th	2,488.45
Timothy.	
1st cutting, June 25th	3,644.15
2nd do July 9th	4,195.84
3rd do " 25th	3,401.69

Practical Results:

1. Grasses deteriorate as they mature.

2. Their digestibility decreases with maturity.

3. Cut hay at the time when the acre will yield the maximum quantity of digestible matter.

4. This will be, for clover, about the time a sprinkling of brown blossoms or heads appears over the field; and, for timothy, soon after the first blossom falls.

Composition of Lucerne as Affected by Maturity.

A considerable amount of lucerne, or alfalfa, is grown in different parts of the Province. The plant seems to prefer a light, sandy or loamy soil, with a subsoil through which its long roots can penetrate. It has, however, been successfully grown on a clay soil. On such a soil greater pains must be taken to secure a good stand; but, once the plant is established, the character of the subsoil is of more importance than that of the surface soil. On account of the large amount of food it will produce during the season, and the rapid growth it makes in the spring, lucerne has been used very largely as a supplementary food. It is usually grown where it is convenient for cutting and feeding to the farm animals in the green state. The idea seems to prevail that though this plant will produce an immense amount of rich food, yet when it is cut and cured as hay, the result is a harsh, stalky, indigestible fodder. To ascertain what truth there may be in this idea, and to learn, if possible, at what stage in its growth the plant should be cut to get the maximum amount of digestible constituents, we have commenced a study of its composition and digestibility as affected by maturity. For this purpose we cut the the second growth of lucerne for this season at three different stages of ripeness. The first cutting was made when the blossom was just appearing; the second, eleven days later, when the plants were in full bloom; the third, thirteen days later, when most of the blossom had fallen. The treatment of these different cuttings was exactly similar to that given the clover and timothy which is outlined in the previous experiment. It is our intention to repeat the work another season with an increased number of digestion experiments. For, while the work here reported has been very carefully done, it requires repeating and confirming before definite conclusions can be drawn.

The following table gives the calculated amounts of dry matter of the several cuttings per acre:

Pounds of Dry Matter per Acre.

Dates of cutting.	Pounds of dry matter per acre.
July 6th	3,197.17
" 17th	3,819.35
" 30th	3,317.71

It will be seen from the above figures that there was an increase of dry weight until full bloom was reached. After that period there was a decrease, which can be at least partially accounted for by the large number of leaves which had fallen previous to the third cutting. Not only was the dry matter less in the third cutting, but the percentages of the most valuable food constituents had also decreased. This is shown in the following table:

Composition of Lucerne Hay Harvested at Different Dates.

Dates of cutting.	In fresh material.							Calculated to water-free substance.					
	Water.	Ash.	Crude protein.	Crude fibre.	Nitrogen-free extract.	Crude fat.	Amides.	Ash.	Crude protein.	Crude fibre.	Nitrogen-free extract.	Crude fat.	Amides.
July 6th	81.31	1 60	3.76	5.32	7.08	0.93	0.70	8.54	20.12	28.47	37.88	4.99	3.73
" 17th	75.20	1.75	3.86	7.83	10 64	0.72	1.12	7.09	15.54	31.57	42.90	2.89	4.52
" 30th	71.17	1.79	3.97	11.67	10 83	0.57	0.83	6.23	13.79	40.46	37.54	1 99	2.88
American analyses	.....	.....	.....	.....	.....	.....	.....	11.10	16.30	30.53	39.23	2.92	3.53
	.....	.....	.....	.....	.....	.....	.....	8.04	12.99	36.77	38.84	2.07	1.42
	.....	.....	.....	.....	.....	.....	.....	7.31	10.37	41.36	39.25	1.76	0.98

Like clover and timothy, as shown in the last experiment, lucerne shows a decrease in percentage of water as maturity advances. Referring to the portion of the table in which the composition is calculated to water-free substance, it will be noticed that the crude protein also decreases, and that the crude fibre increases very rapidly. It must follow that lucerne, like clover and timothy, decreases in food value as it approaches maturity; but the deterioration is much more rapid in lucerne, for there is a greater decrease in protein and increase in fibre in the 24 days covered by this experiment than in the 30 days of the clover and timothy experiment.

For the sake of comparison, the average of some American analyses of cuttings made at similar stages of maturity to our own, have been placed in the above table.

It is a matter of everyday experience that only a part of the food eaten is actually used by the animal. It is, therefore, of importance to have a knowledge, not only of the chemical composition of lucerne, but of the amounts of the nutrients which are capable of being assimilated. The digestibility of the lucerne was, in this case, determined with a shearling wether. As only one digestion experiment was made with each cutting, we do not wish to give them undue prominence. The results are given in the table below:

LUCERNE DIGESTION CO-EFFICIENT.

Pounds of each constituent digested per 100 pounds fed.

Cuttings.	Dry matter.	Protein.	Fat.	Nitrogen-Free Extract.	Fibre.
1st Cutting	60.62	78.97	71.49	70.63	37.11
2nd "	59.47	70.78	41.69	70.50	50.39
3rd "	49.88	67.68	48.92	61.73	36.45

We were unable to find a record anywhere of digestion experiments having been conducted with lucerne clover at stages of maturity similar to our own, and consequently have nothing with which to compare our results. The table shows clearly that there is a decrease in the digestibility as the plant matures. Using these figures and those in the table giving the pounds of dry matter per acre, we are able to calculate the pounds of dry matter digested per acre. They are given in the table below:

Pounds of dry matter digested per acre.

Dates of cutting.	Pounds of dry matter digested per acre.
July 6th	1,938.12
" 17th	2,271.36
" 30th	1,654.87

We do not feel that there has been sufficient work done to warrant us in drawing any definite conclusions, but the work certainly indicates the following:

1. That lucerne deteriorates with maturity.
2. That its digestibility decreases with maturity.
3. That from early to full bloom it contains the largest amount of digestible matter.
4. That from this stage on it deteriorates faster than clover or timothy.

It is interesting to compare the composition of common red clover, timothy, and lucerne clover, cut at the time when they apparently yield the maximum amount of digestible matter. In each case the hay was cured without rain or dew. The table shows the composition as the hay was taken from the field :

Hay.	Water.	Total dry matter.	Protein.	Fat.	Nitrogen-free extract.	Fibre.	Ash.
Red clover..... ...	24.98	75.02	11.51	4.28	33.55	19.46	6.22
Timothy	24.31	75.69	4.19	2.52	37.76	26.72	4.50
Lucerne clover	23.62	76.38	11.87	2.21	32.77	24.12	5.41

In conclusion, I beg gratefully to acknowledge the co-operation and assistance of the experimental department in carrying on our experimental work.

Respectfully submitted,

R. HARCOURT,

November 27th, 1897. Assistant Chemist.

PART V.

REPORT OF THE

PROFESSOR OF VETERINARY SCIENCE.

To the President of the Ontario Agricultural College :

SIR,—I beg herewith to submit my annual report for 1897.

WORK IN THE CLASS-ROOM.

The work in the class room has been much the same as in previous years, but with an effort to make it still more practical. We always find that the work for first year students in my subjects, viz., Veterinary Anatomy and Veterinary Materia Medica, are very dry and hard to understand, and I endeavor to make them as simple as possible. The fall and winter terms with this class are taken up with the study of the bones, ligaments, muscles, tendons and joints; the anatomy of the digestive, respiratory, urinary, generative, circulatory, and nervous systems; and the organs of special sense. We have in the class-room a skeleton of a horse; I usually have also a living horse, and the several bones, and when studying a bone or joint, etc., we notice it in the skeleton and also its position in the living animal, thereby impressing more thoroughly its form and situation upon the students' minds. Where any particular difference exists between the anatomy of the horse and the ox, we notice the same. I have also delivered a course of lectures, or rather talks, to the students on what may be called "Practical Stable." In these talks I take the students to the horse stables on the farm and talk about the most approved methods of building stables as regards site, size, size of single and box stalls, mangers, racks, floors, ventilation, drainage, etc.; speak of the proper times and manner of watering stock, the kinds and quantity of food, when and how often to feed, etc.; also the care of harness, saddles, etc., etc. During the spring term, I delivered a course of lectures on the different medicines generally used in veterinary practice. When lecturing on a medicine, we have a sample of it in the class-room, in order that the students may become familiar with its appearance, odor, etc. When practicable, I hold a post mortem in the presence of the class, but I am pleased to state that very few opportunities have occurred during the past year.

The class-room work of the second year, for the fall and winter terms, consists of the consideration of the causes, symptoms and treatment of the ordinary diseases to which farm stock is subject. During this course I usually have one of my own horses in the class room, and explain the different appearances of a diseased and a healthy animal. When speaking of the diseases of bone, I show the class the condition the disease causes, explaining its nature and comparing the parts with a healthy part (I have specimens of mostly all diseases of bone in the class-room); point out and explain the alterations these diseases cause in the living animal and the manner of treatment. In this course of lectures, as in all others, I endeavor to make the points as simple as possible. During the winter term, I give to this class a course of practical horse lessons, or illustrations, in

which I point out and explain the desirable and undesirable points of the different classes of horses, sometimes having one of my own horses and sometimes one of the farm horses in the class-room. For this purpose we have not got pure-bred animals ; but we have fair representatives of the different classes, and I endeavor to point out the characteristics of each class, in order that the students may be able to distinguish between them, a point, I may say, in which many so-called horsemen are very deficient. I illustrate and explain the manner of securing horses for minor operations, illustrate the different methods of dressing and stitching wounds, paring feet, trimming manes and tails, docking, firing for bone diseases, blistering, bandaging, throwing by side lines and hobbles, placing in slings, the different methods of administering medicines, with the advantages and disadvantages of each method; the way to dress and pull teeth, how to pass a probang in a cow, operate on a teat, etc., etc. This course of lectures is very interesting and instructive to the students, and will certainly be of great value to all who will have much to do with live stock in after life.

During the spring term, I lecture to this class on Veterinary Obstetrics, and illustrate my lectures, as far as possible, by charts.

THIRD YEAR.—To this class I deliver a short course of lectures upon the points and characteristics of the different breeds and classes of horses.

To the special dairy class I deliver a few lectures, in which I speak of the causes, symptoms, and treatment of the ordinary diseases of the dairy cow.

Besides the work in the class-room, I give professional attention to the farm, experimental, and dairy stock, and I am very pleased to be able to state that during the past year, while we have necessarily had a good deal of sickness, the losses have been slight, especially so when we consider the amount of experimental feeding that has been carried on, as we all know that such feeding is more likely to generate disease than ordinary feeding. Below will be seen the particulars of the diseases which occurred during the year in the different kinds of stock.

Horses.—We had a few serious cases of acute indigestion, and some cases of colic, influenza, lymphangitis, calks, bruises, eczema, and other diseases, all of which made favorable recoveries.

Cattle.—We had a fatal case of inflammation of the lungs in a farm cow, and a fatal case of bronchitis in one of the dairy cows. We also had four critical cases of parturient apoplexy, but they all made perfect recoveries. We had several cases of impaction of the rumen, mammitis, fardel bound, diarrhœa, constipation, sore teats, etc., all of which also made good recoveries.

Swine.—We lost four small pigs in the experimental piggery from constipation, caused by eating saw dust, with which they were bedded. We removed the saw dust, used straw, and had no further trouble. We lost another pig in the same piggery from purulent pneumonia.

In the farm piggery a Poland China sow was found dead one morning, and a post-mortem revealed the cause of death to be rupture of a blood vessel ; and a Berkshire sow, in the same piggery, died from over exertion from fighting, one hot day.

Sheep.—We had two fatal cases of wool balls in the pyloric orifice in lambs ; one fatal case of purulent mammitis in a ewe, and a fatal case of enteritis in a Dorset ewe. Some of the lambs showed signs of tapeworm in June, so we adopted our usual treatment, viz.: a decoction of pumpkin seeds, giving each lamb the product of about two ounces of seeds every ten days, in five doses, and we had no losses.

I have, sir, the honor to be

Your obedient servant,

J. H. REED.

GUELPH, Nov. 24th, 1897.

PART VI.

REPORT OF

PROFESSOR OF DAIRY HUSBANDRY.

To the President of the Ontario Agricultural College:

SIR,—I beg leave to submit my seventh annual report of the Dairy Department.

EXPERIMENTS IN CHEESE-MAKING.

The experiments in the Cheese Department were in charge of Mr. R. W. Stratton.

Some experiments were made with cultures sent to the Dairy by the bacteriologist, which are not ready to be reported upon at this date (November). One culture got from cheese sent by Mr. Publow, of Perth, developed a very bad flavor, and the cheese from the milk in which it was used was also very tough in texture. This cheese was made in August, and was still tough and leathery when scored by Mr. Brill, on Nov. 15th. The results of a few trials of different methods of handling over-ripe milk will be left over until another year, as we have not sufficient data upon which to base conclusions.

RELATION OF FAT IN MILK TO QUANTITY AND QUALITY OF CHEESE.

This is the fourth year that experiments relating to this question have been made in the Dairy Department. Next year we hope to give a summary of five years' work on the points investigated by us. The following is a summary for the past year:

1. The number of experiments made was 27.
2. 600 lbs. milk were used in each vat, or 32,400 pounds altogether.
3. The percentage of fat in the milk ranged from 2.8 to 4.3.
4. Both vats were ripened to the same degree before renneting.
5. About one per cent. of starter was used in each vat when needed.
6. H (rich milk) curds were cooked at 100° and the L (poor or medium milk) were cooked at 98°.
7. Both curds were given about one-eighth of an inch of acid before dipping.
8. The H curds mellowed more quickly than the L curds and were ready to salt in less time.
9. The H curds were salted $\frac{1}{4}$ lb. extra per 100 pounds curds.
10. The temperature for putting to press was about 80° for both curds.
11. The curds were pressed about 20 hours.
12. The curing room ranged from 60° to 75° in temperature.
13. All cheese were weighed and marked when taken from the hoops. They were weighed again at the end of one month.
14. The cheese were scored by Messrs. A. T. Bell and G. J. Brill, when about six weeks old, except those made in October, which were scored Nov. 15th. The scale used was: Flavor, 35; closeness, 20; even color, 15; texture, 20; finish, 10.

The tables show the detailed results of the most important points, by months:

Relation of fat in milk to quantity and quality of cheese.

Date.	Per cent. fat in milk.	Lbs. fat in milk.	Lbs. of cheese.		Lbs. milk for 1 lb. cheese.		Lbs. cheese for 1 lb. fat in milk.		Per cent. fat in whey.
			Green.	Cured.	Green	Cured	Green	Cured	
April 6	4.30	25.80	63.50	61.50	.....	.....	.....	2.38	0.20
	3.40	20.40	55.50	53.75	.....	.....	.....	2.63	0.20
" 13	4.00	24.00	63.50	61.25	.....	.....	.....	2.55	0.20
	3.40	20.40	57.75	55.75	.....	.....	.....	2.73	0.20
" 20	4.30	25.80	66.25	63.75	.....	.....	.....	2.47	0.30
	3.50	21.00	58.50	56.25	.....	.....	.....	2.67	0.20
" 27	3.90	23.40	62.00	60.00	.....	.....	.....	2.56	0 25
	3.40	20.40	56.50	54.50	.....	.....	.....	2.67	0.25
Average for rich milk	4.12	99.00	255.25	246.50	9.40	9.73	2.57	2.49	.237
Average for poor milk	3.42	82.20	228.25	220.25	10.51	10.89	2.77	2.67	.212
May 4	3.90	23.40	61.25	59.25	.....	.....	.....	2.53	0.40
	3.20	19.20	50.25	48.50	.....	.....	.....	2.52	0.35
" 12	4.20	25.20	62.25	60.00	.....	.....	.....	2.38	0.40
	3.20	19.20	53.50	51.50	.....	.....	.....	2.68	0.30
" 18	3.60	21.60	60.25	58.50	.....	.....	.....	2.70	0.35
	2.80	16 80	53.25	51.50	.....	.....	.....	3.06	0.25
" 26	3.65	21.90	64.00	62.00	.....	.....	.....	2.83	0.35
	2.90	17.40	45.00	52.25	.....	.....	.....	3.00	0.20
Average for rich milk	3.83	92.10	247.75	239.75	9.68	10.01	2.69	2.61	.375
Average for poor milk	3.02	72.60	211.00	203.75	11.37	11.77	2.90	2.81	.275
June 1	3.90	23.40	63.75	62.00	.....	....	.....	2.64	0.25
	3.00	18.00	54.75	52.50	.....	.....	.....	2.91	0.20
" 8	3.70	22.20	64.50	62.25	.....	.....	.....	2.80	0.30
	2.90	17.40	56.00	54.00	.....	.....	.....	3.10	0.20
" 15	3.70	22.20	62.25	60.00	.....	.....	.....	2.70	0.40
	3.20	19.20	55 00	53.25	.....	.....	.....	2.77	0.25
" 24	3.50	21.00	59.50	57.75	.....	.....	.....	2.74	0.25
	2 90	17.40	53.75	52.00	.....	.....	.....	2.98	0.20
" 29	3.70	22.20	60.00	58.00	.....	.....	.....	2.61	0.25
	3.20	19.20	54.75	52.75	.....	.....	.....	2.75	0.20
Average for rich milk	3.70	111.00	310.00	300.00	9.67	10.00	2.80	2.69	.290
Average for poor milk	3.06	91.20	274.25	264.50	10.93	11.31	3.00	2.90	.210
July 6	3.60	21.60	58.50	56.75	.....	.....	.....	2.62	0.30
	3.00	18.00	53.25	51.50	.....	.....	.....	2.86	0.25
" 15	3.90	23.40	62.25	59.50	.....	....	....	2.54	0.40
	2.90	17.40	52.75	51.50	.....	.....	....	2.95	0 20
" 20	3.90	23 40	61 00	59 25	.....	.....	....	2.52	0.35
	3.00	18.00	53.25	51.25	.....	.....	.....	2.83	0.25
" 28	3.75	22.50	61.25	59.25	.....	.....	.....	2.63	0 40
	2.90	17.40	53.00	51.00	.....	.....	.....	2.93	0.30
Average for rich milk	3.78	90.90	243.00	234.75	9.87	10.22	2 67	2.58	3.62
Average for poor milk	2.95	70.80	212.25	205.25	11.30	11.69	2.99	2.89	.250
August 4	3.80	22.80	59.00	57.25	.....	.....	.....	2.51	0.35
	3.20	19.20	55.25	53.00	.....	.....	.....	2.75	0.30
" 10	3.90	23.40	56.00	54.25	.....	.....	.....	2.31	0.25
	3.20	19.20	54.00	52.25	.....	.....	.....	2.72	0.20
" 24	3.80	22.80	62.00	60.25	.....	.....	.....	2.64	0 35
	3.30	19.80	57.50	55.75	.....	.....	.....	2.81	0.20
Average for rich milk	3.83	69.00	177.00	171.75	10.16	10.47	2.56	2.48	3.18
Average for poor milk	3 23	58.20	166.75	161.00	10.79	11.18	2.86	2.76	2.33

Relation of Fat in milk, etc.—*Continued.*

Date.	Per cent. fat in milk.	Lbs. fat in milk.	Lbs of Cheese.		Lbs. milk for 1 lb. cheese.		Lbs. cheese for 1 lb. fat in milk.		Per cent. fat in whey.
			Green.	Cured.	Green	Cured	Green	Cured	
September 14	3.85	23.10	62.00	60.00	.....	.....	.....	2.59	0.35
	3.15	18.90	58.50	56.50	.....	.....	.....	2.98	0.20
" 21	4.00	24.00	65.50	63.50	.....	.....	.....	2.64	0.30
	3.20	19.20	60.50	58.73	.....	.....	.....	3.05	0.25
" 30	3.90	23.40	63.00	61.50	.....	.....	.....	2.65	0.40
	3.20	20.40	59.50	57.50	.....	.....	.....	2.81	0.30
Average for rich milk	3.91	70.50	190.50	185.00	9.44	9.72	2.70	2.62	.350
Average for poor milk	3.25	58.50	178.50	172.75	10.00	10.41	3.05	2.95	.250
October 6	4.00	24.00	64.25	62.25	.....	.....	.....	2.59	0.35
	3.40	20.40	60.25	58.25	.....	.....	.....	2.85	0.30
" 15	3.80	22.80	61.25	59.25	.....	.....	.....	2.59	0.35
	3.30	19.80	59.00	57.00	.....	.....	.....	2.87	0.20
" 22	3.70	22.20	64.00	62.00	.....	.....	.....	2.79	0.35
	3.30	19.80	58.75	56.75	.....	.....	.....	2.86	0.30
" 26	4.20	25.20	64.75	62.75	.....	.....	.....	2.49	0.40
	3.30	19.80	60.50	58.50	.....	.....	.....	2.95	0.30
Average for rich milk	3.92	94.20	254.25	246.25	9.43	9.82	2.69	2.61	.362
Average for poor milk	3.32	79.80	238.50	230.50	10.06	10.41	2.98	2.88	.276

Butter Fat Lost in Whey.

The loss of fat in the whey at dipping, and in the drippings from dipping to milling, from milling to salting, and from salting until the cheese were taken from the hoops, has been very carefully determined during the past year. In addition, the Chemical Department determined the casein in the whey and drippings from seven experiments during June and July ; so our data on these points are new and very interesting to the close student of cheesemaking.

Date.	Vat.	Drippings from dipping to milling.			Drippings from milling to salting.			Drippings after salting and pressing.		
		Lbs.	Per cent. fat.	Lbs. fat lost.	Lbs.	Per cent. fat.	Lbs. fat lost.	Lbs.	Per cent. fat.	Lbs. fat lost.
April 6	H.	10.50	.15	.01575	1.75	1.00	.0175	6.50	4.90	0.31850
" 13	"	6.50	.05	.00325	2.25	2.00	.0450	8.25	2.80	0.13100
" 20	"	9.00	.20	.01800	1.50	2.70	.0405	8.00	2.80	0.22400
" 27	"	4.00	.10	.00400	1.00	2.40	.0240	8.00	2.00	0.16000
Total	.....	30.00		.04100	6.50		.1270	30.75		0.83350
Average	.....	7.50	.136	.01025	1.61	1.953	.03175	7.68	2.710	0.20837
April 6	L.	11.25	.10	.01125	2.25	.90	.02025	7.00	1.50	0.11200
" 13	"	8.75	.05	.00437	2.25	1.90	.04275	8.25	1.70	0.14025
" 20	"	9.50	.10	.00950	1.50	1.30	.01950	7.25	1.40	0.10150
" 27	"	9.00	.10	.00600	1.00	2.20	.02200	6.75	3.40	0.22950
Total	.....	35.50		.03112	7.00		.10450	29 25		0.58325
Average	.....	8.87	.087	.00778	1.75	1.492	.02612	7.31	1.994	0.14581

Butter Fat Lost in Whey.—*Continued.*

Date.	Vat.	Drippings from dipping to milling.			Drippings from milling to salting.			Drippings after salting and pressing.		
		Lbs.	Per cent. fat.	Lbs. fat lost.	Lbs.	Per cent. fat.	Lbs. fat lost.	Lbs.	Per cent. fat.	Lbs fat lost.
May 4	H.	5.00	.40	.02000	1.00	2.20	.02200	7.50	1.80	.13500
" 12	"	9.00	.25	.02250	1.50	6.00	.09000	7.50	4.20	.31500
" 18	"	8.75	.25	.02187	1.50	5.60	.08400	7.75	2.20	.17050
" 26	"	8.00	.10	.00800	1.25	2.00	.02500	7.00	1.20	.08400
Total	.....	30.75		.07237	5.25		.22100	29.75		.70450
Average	.....	7.68	.235	.01809	1.31	4.209	.05525	7.43	2.368	.17612
May 4	L.	5.25	.20	.01050	1.00	3.70	.03700	6.25	1.80	.11250
" 12	"	5.50	.10	.00500	2.00	4.20	.08400	6.50	3.30	.21450
" 18	"	8.50	.05	.00425	2.50	1.90	.04750	7.25	.90	.06525
" 26	"	9.00	.10	.00900	1.75	1.60	.02800	6.25	1.20	.07500
Total	.....	28.25		.02875	7.25		.19650	26.25		.46725
Average	.....	7.06	.101	.00718	1.81	2.710	.04912	6.56	1.780	.11681
June 1	H.	6.00	.25	.01500	2.25	4.90	.11025	6.50	2.20	.14300
" 8	"	6.75	.15	.01012	1.75	3.80	.06550	7.75	1.40	.10850
" 15	"	7.00	.20	.01400	1.25	5.40	.06750	7.00	1.70	.11900
" 24	"	5.00	.20	.01000	0.50	3 20	.01600	7.00	1.20	.08400
" 29	"	7.25	.10	.00725	1.25	1.70	.02125	7.50	.90	.06750
Total	.....	32.00		.05637	7.00		.28050	35.75		.52200
Average	.....	6.40	.207	.01127	1.40	4.007	.05610	7.15	1.460	.10440
June 1	L.	6.25	.20	.01250	2.25	3.70	.08325	7.25	1.80	.13050
" 8	"	8.50	.05	.00425	2.50	1.50	.03750	6.50	1.00	.06500
" 15	"	8.00	.05	.00400	2 00	1.40	.02800	6.25	1.00	.06250
" 24	"	6.00	.10	.00600	0.50	1.20	.00600	6.00	1.00	.06000
" 29	"	9.00	.05	.00450	1.75	1.00	.01750	6.50	.50	.03250
Total	.....	37.75		.03125	9.00		.17225	32.50		.35050
Average	.....	7.55	.098	.00625	1.80	1.913	.03445	6.50	1.078	.07007
July 6	H.	4.75	.55	.02612	0.75	2.30	.01725	7.00	1.50	.10500
" 13	"	4.00	.40	.01600	0.50	2.70	.01350	7.25	1.00	.07250
" 20	"	7.00	.60	.04200	1.50	4.50	.06750	7.50	1.50	.11250
" 28	"	8.00	.30	.02400	1.50	2.40	.03600	7.00	1.40	.09800
Total	.....	23.75		.10812	4.25		.13425	28.75		0.45807
Average	.....	5.93	.455	.02703	1.06	3.158	.03356	7.18	1.349	.07900
July 6	L.	5.50	.45	.02475	1.25	2.00	.02500	6.00	1.20	.07200
" 13	"	7.00	.05	.00350	3.00	1.30	.03900	5.50	.80	.04400
" 20	"	6.00	.15	.00900	2.00	2.60	.04200	6.50	1.50	.09750
" 28	"	.....	.....	.....	1.00	1.30	.01300	6.00	1.30	.07800
Total	.....	18.50		.03725	7.25		.11900	24.00		.29150
Average	.....	6.16	.201	.01241	1.81	1.641	.02975	6.00	1.215	.07287
August 4	H.	3.25	.10	.00325	1.00	1.40	.01400	8.00	3.20	.25600
" 10	"	5.50	.25	.01375	3.00	1.70	.05100	8.00	6.80	.54400
" 24	"	.....	.....	.....	.....	.....	.....	8.00	2.20	.17600
Total	.....	8.75		.01700	4.00		.06500	24.00		.97600
Average	.....	4.37	194	.00850	2.00	1.625	.03250	8.00	4.066	.32533

Butter Fat Lost in Whey, etc.—*Continued.*

Date.	Vat.	Drippings from dipping to milling.			Drippings from milling to salting.			Drippings after salting and pressing.		
		lb.	percent. fat.	lb. fat.	lb.	percent. fat.	lb. fat.	lb.	percent. fat.	lb. fat.
August 4	L.	5.75	.05	.00287	1.00	1.60	.01600	6.25	1.60	.10000
" 10	"	6.50	trace	.00000	4.00	0.40	.01600	7.00	1.30	.09100
" 24	"	.....	.....	.....	.....	.....	.....	5.50	1.20	.06600
Total		12.25		.00287	5.00		.03200	18.75		.25700
Average		6.12	.023	.00143	2.50	.650	.01600	6.25	1.370	.08553
September 14	H.	5.75	.15	.00862	1 80	2.70	.04050	8.50	1.70	.14440
" 21	"	9.00	.15	.01350	1.75	1.00	.01750	7.25	1.50	.10875
" 30	"	.....	.....	.....	2.25	1.30	.02925	7.00	3.00	.21000
Total		14.75		.02212	5.50		.08725	22.75		.46325
Average		7.37	.150	.01106	1.83	1.586	.02908	7.58	2.036	.15441
September 14	L.	6 50	.05	.00325	2.50	2.50	.06250	7.50	.800	.06000
" 21	"	5.75	trace	.00000	1.25	1.00	.01250	7.00	.60	.04200
" 30	"	.....		.....	3.50	1.00	.03500	6.50	1.80	.11700
Total		12.25		.00325	7.25		.11000	21.00		.21900
Average		6.12	.026	.00162	2.41	1.517	.05500	7.00	1.042	.07300
October 6	H	5.25	.30	.01575	1.25	1.20	.01500	7.00	2.80	.19600
" 15	"	5.00	.40	.02000	0.75	2.00	.01500	6.75	3.60	.24300
" 22	"	5.25	.30	.01575	0.25	2.20	.00550	6.00	1.00	.06000
" 26	"	6.00	.30	.01800	1.00	4.40	.04400	7.50	1.20	.09000
Total		21.50	.....	.06950	3 25	....	.07950	27.25	.....	.58900
Average		5.37	3.23	.01737	0.81	2.446	.01987	6.81	2.161	.14750
October 6	L	10.00	.10	.01000	2.50	1.00	.02500	6.50	1.60	.10400
" 15	"	7.50	.15	.01125	2.50	1.70	.04250	5.50	2.30	.12650
" 22	"	6.50	.15	.00975	1.00	1.70	.01700	5.50	0.80	.04400
" 26	"	7.50	.30	.02250	2.50	2.50	.06250	7.50	1.20	.09000
Total		31.50	.....	.05350	8.50	.....	.14700	25.00	.....	.36450
Average		7.87	.169	.01337	2.12	1.741	.03675	6.25	1.458	.09112
Total loss for season.	H	161.50	.....	.38548	35.75	.....	.99450	199.00	.....	4.37625
	L	176.00	.....	.18799	51.25	.....	.88125	176.75	.....	2.53300
Average loss per 600 lb. milk	H	6.46	.....	.01540	1.37	....	.03825	7.37	.....	.16838
	L	7.33	.....	.03783	1.97	.....	.03389	6.54	.....	.09381

The tables show the details of fat lost in the different stages of making. I may add that the fat in the last stage, after salting and pressing, represents all the fat or grease pressed from the green cheese while in the hoops. This fat was carefully gathered from hoops and press, and was mixed with the more liquid part. It was then all melted together and a sample taken for testing with the Babcock tester.

TOTAL FAT LOST IN WHEY (BEFORE DIPPING) AND THE LOSS 100 POUNDS CURED CHEESE.

Total pounds milk used.	Average per cent. fat in milk.	Total loss of fat in whey.	Loss of fat in whey per 100 lb. cured cheese.
		lb.	lb.
3,600	2.88	7.39	2.36
13,200	3.26	29.63	2.46
13,200	3.81	40.09	3.04
2,400	4.23	6.99	2.82

PERCENTAGE OF FAT IN WHEY BY MONTHS.

	Fat in whole milk.		Fat in whey from—	
	Rich milk.	Poor milk.	Rich milk.	Poor milk.
	%	%	%	%
April	4.12	3.42	.237	.212
May	3.83	3.02	.375	.275
June	3.70	3.06	.290	.210
July	3.78	2.95	.362	.250
August	3.83	3.23	.318	.233
September	3.91	2.25	.350	.250
October	3.92	3.32	.362	.276
Average for season	3.87	3.18	.327	.243

CASEIN IN THE WHEY AND DRIPPINGS FROM RICH AND POOR MILK AS DETERMINED IN CHEMICAL LABORATORY.

Date.	Before dipping.		Drippings from dipping to milling.		Drippings from milling to salting.		Drippings after salting and pressing.	
	H	L.	H.	L.	H.	L.	H.	L.
	%	%	%	%	%	%	%	%
June 8	.146	.149	.117	.087	.322	.262	.244	.314
" 16	.177	.081	.165	.108	.377	.279	.332	.249
" 24	.222	.135	.225	.156	.663	.444	.382	.334
" 29	.206	.183	.173	.144	.249	.287	.298	.426
July 6	.152	.120	.185	.117	.485	.349	.247	.227
" 13	.131	.123	.127	.114	.345	.208	.287	.198
" 21	.128	.134	.228	.124	.511	.467	.361	.....
Averages	.166	.132	.174	.121	.421	.328	.307	.291

LOSS IN WEIGHT OF CHEESE DURING ONE MONTH IN CURING ROOM.

Per cent. loss in cheese made from	April.	May.	June.	July.	Aug.	Sept.	Oct.	Average.
Rich milk	3.4	3.2	3.2	3.3	2.9	2.8	3.1	3.1
Poor milk	3.5	3.4	3.5	3.2	3.4	3.2	3.3	3.3

THE EXPERIMENTS GROUPED ACCORDING TO THE PERCENTAGE OF FAT IN THE MILK.

The chief points to observe are (1) the increased yield of cheese per 100 lbs. of milk as the per cent. of fat increases; 2) the decreased yield of cheese per lb. of fat in the milk as the percentage of fat increases in the milk; (3) the increased percentage of fat in the whey as the percentage of fat in the milk increases.

Group.	Percentage of fat in milk		Milk required to make 1 lb. of cheese.	Cheese produced per 100 lbs. of milk.	Cheese produced from 1 lb. of fat in milk.	Per cent. of fat in whey.
	Range.	Average				
I	Below 3	2.88	11.529	8.673	3.01	.225
II	3.00 to 3.50	3.26	10.968	9.117	2.79	.247
III	3.55 to 4.00	3.81	10.013	9.986	2.62	3.29
IV	4.05 to 4.50	4.23	9.677	10.333	2.44	3.25
Average			10.512	9.512	2.70	

THE QUALITY OF THE CHEESE.

The tables show the scoring of the cheese by months. Out of a total possible score of 2,700 points the cheese made from milk averaging (by months) 3.70 to 4.12 per cent. of fat scored 2,399.5 points. The cheese made from milk averaging (by months) from 2.95 to 3.94 per cent. of fat scored 2,349.5 points out of a possible 2,700.

Points scored by cheese.	Flavor.	Closeness.	Even color.	Texture.	Finish.	Total.
April (four experiments):						
Possible score	140	80	60	80	40	400
Milk 4.12 % fat	113.5	72.5	50.5	67.5	40.0	344.0
Milk 3.42 % fat	113.0	72.5	53.5	69.5	40.0	348.5
May (four experiments):						
Possible score	140	80	60	80	40	400
Milk 3.83 % fat	113	72	55	67	40	347
Milk 3.02 % fat	101	72	55	62	40	330
June (five experiments):						
Possible score	175	100	75	100	50	500
Milk 3.70 % fat	146	93	65	89	50	442
Milk 3.06 % fat	136	92	69	82	50	429
July (four experiments):						
Possible score	140	80	60	80	40	400
Milk 3.78 % fat	118	73	54	71	40	356
Milk 2.95 % fat	115	72	55	69	40	351
August (three experiments):						
Possible score	105	60	45	60	30	300
Milk 3.83 % fat	94.5	56.0	42.0	49.0	30	271.5
Milk 3.23 % fat	89.5	56.0	43.0	51.5	30	270
September (three experiments):						
Possible score	105	60	45	60	30	300
Milk 3.91 % fat	93	53	42	52	30	270
Milk 3.25 % fat	89	54	42	54	30	269
October (four experiments):						
Possible score	140	80	60	80	40	400
Milk 3.92 % fat	127	73	56	72	40	368
Milk 3.32 % fat	121	68	55	68	40	352

Table showing average score of qualities in the cheese made from milk grouped according to the percentage of fat:

Percentage fat in milk.	Flavor. (Max. 35).	Closeness. (Max. 20).	Even color. (Max. 15).	Texture. (Max. 20).	Average total score. (Max. 90).
Under 3.00 per cent.....	28.33	18.16	14.16	16.83	77.48
3.00 to 3.50 "	28.43	17.93	13.70	17.00	77.06
3.55 to 4.00 "	29.81	18.25	13.56	17.25	78.87
4.05 to 4.50 "	29.75	18.00	13.00	17.25	78.00

Practical Results of the Experiments.

So far we have been discussing the more scientific aspects of the question, and we now turn to the more practical part, viz., the application of the results to factory work. All factories are conducted for the purpose of making profit. It is also necessary that the profits be equitably divided among those who have a right to share in them. The owner of the factory, the maker, the patrons and the distributors of the cheese are the main persons who have a right to share in these profits. All of those named receive, or ought to receive, their share according to some fixed and just rule. The patron, or producer of the milk, is entitled to the largest share, and hence it is important that this large share should be divided on a sound basis. The three systems of dividing proceeds among patrons of cheese factories in Ontario were fully discussed in bulletin No. 102 and in my last report. Hence, I shall only say here that we consider what may be called the fat and casein (% fat+2) the most just of the three systems there spoken of. It comes nearer to justice, and at the same time stimulates the sending of good milk to the factory. As will be seen in the tables which follow, the milk below 3.5 per cent. of fat does not receive quite so much money as would be represented by the amount of cheese made, while the milk with over 3.50 per cent. of fat receives a bonus.

Pounds milk.	Average per cent. fat.	Pounds cheese made.	Amounts of money (cheese 8c.) credited by three systems and according to weight of cheese.			
			Weight milk.	Per cent. fat.	Per cent. fat + 2.	Weight cheese.
			$ c.	$ c.	$ c.	$ c.
3,600	2.88	312.25	27 40	22 46	24 25	24 98
13,200	3.26	1,203.50	100 45	93 19	95 83	96 28
13,200	3 81	1,318.25	100 45	108 92	105 84	105 46
2,400	4.23	248.00	18 26	21 99	20 64	19 84

Difference in three systems compared with the actual value (at 8 cents per pound) of the cheese produced :

Value of cheese made.	Weight of milk.	Per cent. of fat.	Per cent. fat + 2.	Per cent. fat in milk.
$ c.	$ c.	$ c.	$ c.	
24 98	+ 2.42	− 2.52	− .73	2.88
96 28	+ 4.17	− 3.09	− .45	3.26
105 46	− 5.01	+ 3.46	+ .38	3.81
19 84	− 1.58	+ 2.15	+ .80	4.23

Conclusions: 1. The yield of cheese per 100 pounds of milk increased when the per-cent. of fat increased, but it did not increase in exactly the same proportion.

2. The yield of cheese per pound of fat in the milk decreased as the percentage of fat increased

3. The yield of cheese is fairly proportionate to the fat and casein in the milk. The casein may be represented by the figure 2 added to the percentage of fat in the milk.

4. The highest average score of cheese made was in the group where the milk ranged from 3.55 to 4.0 per cent. of fat.

5. The H. cheese lost 3.1 per cent. in weight while curing; the L. cheese lost 3.3 per cent.

6. The loss of fat in whey, drippings and pressings was greater from the H. (rich) milk. This is especially marked in the drippings after salting, which include the grease pressed out of the cheese while in the hoops. The loss of fat at this stage is nearly double that from L. (medium and poor) milk.

7. In those experiments where the percentage of casein was determined, it showed a greater average loss of casein at each stage of the making, from the H. milk as compared with the L. milk.

8. We recommend the percentage of fat + 2 system for distributing proceeds among patrons of cheese factories.

Rapid Curing Cheese *vs.* Slow Curing Cheese.

During May and June thirty trials were made, by comparing the use of an extra quantity of rennet and less salt with the usual amount of these, and noting the effect on the time required for curing the cheese and also the effect on quality. The May cheese were scored by Mr. Brill on June 18th; the June cheese were scored on July 14th and August 7th. About half the cheese made during each month was kept for about a month after the first scoring, to note the effect on the keeping quality of the cheese made by the two methods. Where the extra amount of rennet and the small quantity of salt were used the cheese ripened and went off in flavor more quickly. The tables show the main differences in making and in the quality of the cheese.

Kind of cheese.	Average lbs. milk used.	Average per cent. fat in milk.	Average rennet test, seconds.	Rennet used per 1,000 lbs. milk.	Average minutes curdling.	Average hours from setting to dipping.	Average hours from dipping to salting.	Average rate of salt per 100 lbs. curd.	Weight of cheese.	
									Green.	Cured.
				ozs.		h m	h m	lbs.	lbs.	lbs.
Slow curing	600	3.36	24.2	$3\frac{1}{5}$	35 8	3 24	3 44	$2\frac{3}{4}$	58.28	56.13
Quick curing	600	3.36	24.0	$4\frac{1}{2}$	25 8	2 51	2 54	2	58.93	56.71

Kind of cheese.	Scoring.	Flavor. (Max. 35.)	Closeness. (Max. 20.)	Texture. (Max. 20.)	Total. (Max. 100.)
Slow curing	First	29.93	18.20	17.13	89.00
	Second	28.57	18.14	16.42	87.00
	Average	29.50	18.18	16.90	88.31
Quick curing	First	29.73	18.20	17.00	88.66
	Second	27.42	17.57	16.00	84.42
	Average	29.00	18.00	16.72	87.31

Conclusions: In the spring of the year, when it is usually the best policy to make cheese which will cure or ripen quickly, we advise the use of four to five ounces of rennet per 1,000 pounds of milk, or sufficient to cause coagulation in twenty to twenty-five minutes. Less salt—say two pounds per 100 pounds of curd or per 1000 pounds milk—may also be used. The cheesemaker will need to use judgment and watch the markets. If the demand for cheese is brisk, such as was the case in the spring of 1897, he would be quite safe in making a quick-curing cheese; on the other hand, if the markets are dull and there is a prospect of the cheese being held, he would need to be careful in making soft cheese. It would be better under such conditions to make them firmer by using less rennet, stirring more, and using more salt.

Stirring Curds.

It is customary among Canadian makers to stir the curds more or less after "dipping." It was suggested that curds need not be stirred so much if an extra quantity of salt were applied to the curd. This, it was said, would lessen the labor and produce just as good results.

During September and October seven trials were made, by dividing 1,200 pounds of milk into two vats and treating them the same, except that one vat was not stirred after dipping but to the curd an extra quantity of salt was added. There was practically no difference in the time of milling and salting the two curds. The table shows the chief points.

Conclusions.

1. By not stirring the curd there was an extra pound of cured cheese made from 600 pounds of milk.

2. The quality of the two cheese was much alike.

3. With a small curd the extra salt applied seemed to have the same effect as hand stirring of the curd.

Kind of cheese.	Average lbs. milk used.	Average per cent. fat in milk	Average lbs. cheese from 600 lbs. milk.	Average rate of salt per 100 lbs. curd.	Average Score.			
					Flavor.	Closeness.	Texture	Total.
Extra moisture	600	3.41	59.85	3¼	30.59	17.71	17.28	89.49
Dry stirred...	600	3.41	58.78	2⅜	30.42	17.57	17.71	89.49

Aeration of Milk for Cheese Making.

Fifteen experiments were made during July, August and September, in which one vat consisted of milk which had been aerated, while the other vat was unaerated milk. A part of the aerated milk was from our own cows and a part was from herds which supplied us with milk. Two kinds of aerators were used, viz, those which expose the milk to the air in thin sheets, and those which force air into the milk.

On July 26th, there were two vats of milk from the milking machine. One was aerated, the other was not. Both were very bad in flavor, both curds were "floaters," and both lost a great deal of butter fat. The drippings (whey from milking to and after, pressing) weighed 9¼ lbs., testing 23 per cent. fat from the aerated milk; while the unaerated tested 25 per cent. fat and weighed 12 pounds. The yield of cheese was 22½ lbs. from the aerated and 20½ from the unaerated. The flavor of the aerated milk cheese was scored 26 out of 35, while the unaerated scored 20. The total score was 83 and 75 respectively.

Conclusions.

1. While the average of the results does not indicate much difference in the yield or quality of the cheese, nor did aerating the milk prevent the formation of gas, yet the gas was easier got rid of from the aerated milk curds; and in case of badly flavored milk, the aeration made an improvement in the yield and quality of the cheese.

2. We shall need to make further experiments before making any very definite statements about the effects of aeration on milk for cheesemaking. In the meantime, we advise aeration in or with a pure atmosphere.

	Average lbs. milk used.	Average per cent. fat in milk.	Average lbs. cheese from 300 lbs. milk	Scoring.	Average flavor. (max. 35)	Average closeness. (max. 20).	Average texture. (max. 20).	Average total. (max. 100).
Aerated	300	3.50	27.61	First	29.60	17.73	16.80	87.73
				Second	28.33	18.33	17.66	88.00
				Average	29.38	17.85	16.93	87.77
Unaerated	300	3.50	27.28	First	29.33	17.53	17.13	88.00
				Second	28.66	18.66	18.00	89.33
				Average	29.22	17.72	17.27	88.22

Pasteurizing of Milk for Cheesemaking.

Four methods of treating the milk after pasteurizing were tried with but limited success, viz, making up the same day as pasteurizing, with and without a starter, and making the day after pasteurizing, with and without a starter. The heating of the milk to 160 degrees changes the character of the milk in such a way that it does not work at all like an ordinary Cheddar curd. The cheese made from pasteurized milk resembles stilton cheese in many respects, in fact our experiments point to a new and successful method of making a famous stilton cheese.

The cheese made from heated milk to which a starter was added, more nearly resembled an ordinary Cheddar. The experiments so far made would lead us to doubt the value af pasteurization for Cheddar cheesemaking. In every case where the milk was kept over until the following day, the curds were very gassy.

Pasteurization of Milk for Cheesemaking.

Method of handling the milk.	No. experiments	Average lbs. milk used.	Average per cent. fat in milk.	Average per cent. fat in whey.	Average hours from setting to dipping.	Average hours from dipping to salting.	Average lbs. cheese from 300 lbs. milk.	
							Green.	Cured.
					h. m.	h. m.		
(1) Cheese made same day as pasteurized but without starter	2	300	3.80	.45	5 00	3 30	38.87	35.12
(2) Made same day as pasteurized with starter	1	300	3.30	.20	3 40	4 00	32.00	30.25
(3) Made day after pasteurized with starter	3	300	3.43	.26	3 47	5 01	30.75	29.25
(4) Made day after pasteurized without starter	3	300	3.43	.35	3 54	5 11	32.08	30.58

Quality of Cheese made from Pasteurized Milk.

Method of handling the milk.	No. experiments.	Average score.			
		Flavor. (max. 35).	Closeness. (max. 20).	Texture. (max. 20).	Total. (max. 100).
(1) Made same day as pasteurized but without starter	2	27.0	17 5	15 5	81.00
(2) Made same day as pasteurized with starter	1	25 0	17.0	16.0	82.00
(3) Made day after pasteurized with starter	3	27.0	17.0	17.0	85.00
(4) Made day after pasteurized without starter	3	25.0	16.6	15.6	81.00

Ripening Milk before adding Rennet.

During May and June eight trials were made, to see the effect of ripening milk before renneting. This is a continuation of last year's work. The ripeness of the milk was determined by means of the rennet test commonly used in factories. The rennet test varied from thirteen to thirty-one seconds. The general rule seems to be that a difference of one second in the rennet test will make a difference of about two minutes in the time required for coagulation, although there are some marked exceptions to this rule.

In cases where the milk was set sweet, the curd remained in the whey for a longer time, but all were in a fit condition to salt in about the same length of time.

Effect of varying the rennet test, or of different degrees of ripeness at setting:

Date.	Per cent. fat in milk.	Rennet test—seconds.	Minutes coagulating.	Time from setting to dipping	Time from dipping to salting.	Per cent. fat in		Lbs. cheese.		Score.
						Whey.	Drippings and pressings.	Green.	Cured.	Max. 100
				h. m.	h. m.					
May 5	3.40	19	37	3.19	3.00	.30	1.30	57.25	55.25	92
"	3.40	14	27	2.38	3.00	.40	1.20	55.50	53.50	89
" 6	3 60	19	35	2.53	2.52	.25	1 00	56.75	54.75	93
"	3.60	13	25	2.19	2.53	.25	1.00	56.75	54.75	95
" 8	3.50	18	31	3.11	3.02	.25	1.00	57.00	55.00	93
"	3.50	14	25	2.42	3.00	.25	1.60	56.25	54.25	96
" 15	3.70	20	40	3.07	2.37	.30	2 80	59.50	57.00	87
"	3.70	17	26	1.50	2.34	.35	2.50	60.75	58.00	83
" 31	3.40	25	33	3.00	2.54	.25	2.20	60.25	58.00	82
"	3.40	19	26	2.23	2.46	.20	1.50	60.50	58.25	81
" 27	3.40	24	35	2.57	2 57	.25	.50	58.00	55.00	87
"	3.40	20	30	2.22	2 52	·25	1.00	58.00	55.00	85
" 20	3.50	30	43	3.10	2.53	.35	1 90	58 50	56.50	85
"	3.50	24	31	2.18	2.48	.35	1.90	58.50	58.50	88
June 2	3.20	31	45	3.27	3.05	.20	1.00	57.00	55 00	85
"	3.20	25	34	2.55	3.00	.20	1.00	57 00	55.00	83

Making Cheese at Dairy School, O. A. C., Guelph.

Effect of Different Quantities of Rennet.

These are further experiments in addition to similar ones made in 1895 and 1896. The milk was ripened to about twenty-two seconds The quantity of rennet varied from one ounce to eight ounces per 1,000 pounds milk. The minutes required for coagulation varied from seventeen and one half to seventy-nine.

Date.	Rennet test—seconds.	Rate of rennet per 1,000 lbs. milk.	Minutes coagulating.	Time from setting to dipping	Time from dipping to salting.	Lbs. cured cheese from 600 lbs milk.	Per cent fat in		Score.
							Whole milk.	Whey.	Max. 100.
		ounces.		h. m.	h. m				
July 15	22	3	37	2.34	3.08	54.75	3.40	.30	86
" 15	.....	1½	59	2.47	3.03	54.00	3.40	.40	84
" 14	22	3	37	2.44	3.03	54 75	3.40	.30	90
" 14	.....	2	53	2.56	2.55	53.75	3.40	.40	89
" 19	22	3	38	2.53	3 28	53 50	3.30	.30	91
" 19	.....	2½	44	2.58	3.23	53.25	3.30	.35	93
" 17	22	3	38	3.12	3.00	54.75	3.40	.30	93
" 17	.....	3½	33	3.07	3 02	54.75	3.40	.30	87
" 22	23	3	38	3.11	3.30	53.50	3.30	.30	89
" 22	.....	4	26	3.16	3.03	54.50	3.30	.30	89
" 27	22	3	36	2.29	3.38	54.00	3.30	.20	91
" 27	.....	4½	24	2.34	3.27	53.75	3.30	.20	89
" 29	22	3	37	2.52	3.21	55.50	3.50	.30	91
" 29	.....	5	23	2.56	3.13	55.75	3.50	.30	91
" 30	22	3	37	2.54	3.25	54.50	3.50	.30	92
" 30	.....	5½	22	2.59	3.14	54.75	3.50	.30	92
" 31	22	3	39	3.04	3 20	54 00	3.40	.30	86
" 31	.....	6	20½	3.07	3.17	55.00	3.40	.30	88
Aug. 2	22	3	37	2.52	3.20	54.50	3.50	.30	92
" 2	.....	6½	19	2.57	3.03	54.75	3.50	.30	88
" 5	22	3	37	3.04	3.29	55.00	3.50	.30	83
" 5	.....	7	18	2.53	3.17	55.75	3.50	.30	79
" 14	23	3	37	3.30	3.37	56 50	3.50	.30	91
" 14	.....	7½	18	3.19	3.22	56.50	3.50	.30	89
" 23	23	3	38	3 03	4.02	58 75	3.50	.30	96
" 23	.....	8	17½	2.54	3.47	57.25	3.50	.30	93
Oct. 23	19½	3	29	2.48	3.03	61 00	3.60	.25	89
" 23	.....	2	48	2.49	3.05	59 50	3.60	.30	89
" 23	.....	1	79	2.50	3.05	60.00	3.60	.35	89
" 30	23	3	33	2.58	3.13	63.00	3.90	.30	89
" 30	.....	4	30	3 00	3.05	63.00	3.90	.30	89
" 30	.....	5	25	3.02	2.56	63.00	3.90	.30	90

Conclusions.

1. Where less than three ounces of rennet per 1,000 pounds of milk was used there was an extra loss of fat in the whey, and less cheese made. The extra quantity of rennet, above three and one-half ounces, made an extra yield of cheese.

2. The highest scoring cheese were made using two and one half and three ounces of rennet per 1,000 pounds milk

3. The time required for coagulation decreases with an increased quantity of rennet used in the milk, as shown by the table arranged in order of quantity of rennet used :

Rate of rennet per 1,000 lbs. milk.	Minutes coagulating.			
	1895.	1896.	1897.	Average for three years.
1 ounce	65	65.5	79	69.8
1½ "	.....	53	59	56
2 "	42	37	53	44
2½ "	40	36	44	40
3 "	33	.....	36.5	34.7
3½ "	27	.....	.....	27
4 "	26	28	26	26.6
4½ "	25.5	23	24	24.1
5 "	20	26	23	23
5½ "	.....	20	22	21
6 "	18	18.5	20.5	19
6½ "	.....	17.5	19	18.2
7 "	16	17	18	17
7½ "	.....	15	18	16.5
8 "	17.5	14	17.5	16.3
8½ "	.....	14	.....	14
9 "	13	13	.....	13

Effect of Dipping at Different Stages of Acid.

These are a continuation of the experiments made in reference to this question during the past two years. They were conducted in the months of June and July. The milk was first mixed together and then divided into two vats. In a number of trials the percentage of acid was determined with an alkali solution.

Date.	Hot iron test.	Hours from setting to dipping.	Hours from dipping to salting	Lbs. Cheese.		Per cent. Fat in			Score.
				Green.	Cured.	Milk.	Whey	Drippings.	Max. 100.
	inch	h. m.	h. m.						
June 3	⅛	2.45	3.04	57.25	55.50	3.30	.20	1.20	89
" 3	⅛	3.27	2.14	57.00	55.00	3.30	.25	1.40	88
" 7	⅛	3.21	3.20	58.50	56.75	3.50	.25	0.90	86
" 7	⅛	3.54	2.47	58.25	56.50	3.50	.25	1.20	83
" 11	⅛	2.33	2.56	58.50	56.75	3.30	.25	0.80	87
" 11	⅛	3.00	2.36	58.25	56.25	3.30	.25	1.20	87
" 12	⅛	3.10	2.32	57.50	55.00	3.30	.30	1.10	85
" 12	⅛	3.31	2.18	57.50	55.25	3.30	.30	1.40	87
" 14	⅛	2.43	3.13	59 00	57.00	3.60	.30	1.30	92
" 14	⅛	3.33	2.20	59.00	56.75	3.60	.30	2.70	86
" 17	⅛	2.51	3.22	58.25	56.75	3.30	.25	0.70	84
" 17	⅛	3.44	2.30	59.25	57.50	3.30	.25	0.80	88
" 30	⅛	2.42	3 28	57.25	55.50	3.30	.25	1.20	90
" 30	⅛	3.19	2.53	57.00	55.00	3.30	.25	1.50	86
July 2	¼	2.29	3.13	57.75	55 25	3.30	.25	1.10	89
" 2	1	3.27	2.08	57.75	55.25	3.30	.25	2.30	85
" 5	⅛	2.41	3.27	55.50	53.75	3.20	.30	2.00	92
" 5	⅛	3.25	2.36	56.00	54.00	3.20	.30	2.20	88

Conclusions.

1. The time from setting to salting was about the same, irrespective of the time which the curds were allowed to remain in the whey.

2. The yield of cheese was greater by dipping at about one-eighth of an inch of acid, or two-tenths of one per cent., than where the curds were allowed to remain until over one-quarter of an inch of acid showed on the hot iron.

3. The percentage of fat in the drippings (whey from milling until the cheese are removed from the press) was higher in all cases where the curd remained in the whey for a long time.

4. The quality of the cheese was better in nearly every case from dipping at one eighth to one-quarter of an inch of acid as shown on the hot iron.

Hot Iron Test and Percentage of Acid in Whey at Dipping, Milling, and Salting.

Date.	Vat.	At dipping.		At milling.		At salting.
		Hot iron test.	% acid in whey.	Hot iron test.	% acid in whey.	% acid in whey.
		inch.				
June 3	H	1/8	.180	1 1/2	.846	1.062
" 3	L	1/2	.261	1 1/4	.702	1.152
" 7	H	1/8	.180	1 1/4	.846	.999
" 7	L	1/2	.252	1 1/4	.855	1.044
" 30	H	1/8	.207	1 1/8	.....	.990
" 30	L	1/8	.225	1 1/8	.....	1.089
July 2	H	1/4	.225	1 1/8	.819	1.053
" 2	L	1	.252	1 1/4	.954	1.224

Milling the Curd.

This is a repetition of last year's work. In addition, we have the loss of fat from dippings and pressings this year. Before milling the first half of the curd, it was divided into two parts. One part was milled at an average of about one hour and forty minutes after dipping. The hot iron at this time indicated about "one inch of acid." The other half of the curd was milled at periods ranging from one hour to three hours after dipping. The quantity of drippings and pressings from milling until the cheese were taken from the hoops ranged from six to eight pounds. The curd milled first, produced a larger weight of drippings but not so rich in butter fat.

Conclusions.

1. About one-and-a quarter inches was the longest "string" which could be got on the hot iron. After this the "strings" went back.

2. Whether milled at one-and-a-half hours after dipping, or longer, the curds were ready to salt at about the same time.

3. Allowing the curds to remain for two-and a-half to three hours after dipping, and before milling, causes a greater waste of butter fat than milling earlier.

4. There did not appear to be so very much difference in the quality of cheese produced from the two methods.

5. We recommend milling about one-and-a-half hours aftea dipping, or when the curd becomes meaty and shows three-quarters to one inch of acid on the hot iron.

Effect of Milling at Different Stages of Acid.

Date.	Lbs. milk.	Per cent. fat in whole milk.	Hours from dipping to milling.	Acid on hot iron at milling.	Hours from dipping to salting.	Per cent. fat in Whey.	Per cent. fat in Drippings and pressings.	Lbs. cured. Cheese.	Score. (Max. 100.)
			h. m.	inch.	h m.				
April 15	1,200	3.60	1.30	1	2.43	.20	1.40	59 25	93
			1.00	1	2.43	.20	1.20	59.00	92
" 17	1,200	3.80	1.40	1	3.05	.20	2.00	59 50	93
			1.15	1	3.02	.20	2.00	60.00	92
" 19	1,200	3.70	1.40	1	3.05	.20	2.40	59 25	90
			2.00	1	3.02	.20	3 00	59.50	91
" 21	1,200	3.80	1.40	1	2.53	.30	2.40	60.00	89
			2.15	⅞	2.53	.30	3.00	60.25	91
" 22	1,200	3.90	1.40	1	3.00	.25	1.60	59.50	95
			2.30	⅞	3 00	.25	2.40	61.25	93
" 23	1,200	3.60	1.40	⅞	3.25	.20	1.30	57.50	92
			2.45	⅝	3.28	.20	1.30	57.25	91
" 26	1,200	3.80	1.40	1	3.17	.25	2.00	59.50	93
			3.00	⅝	3.20	.25	2 20	60.75	91
May 3	1,200	3.60	1.40	1¼	3.05	.25	.90	58 25	95
			3 00	⅝	3.08	.25	1.10	58.50	94
" 7	1,200	3.50	1.40	1	3.15	.20	1.00	55.00	93
			3.10	⅝	3.25	.20	1.30	55.25	96

Salting Curds one Hour Sooner than Usual.

This is a continuation of last year's experiments under this head. Fifteen experiments were made during April, May, June, September, and October. As a rule, one-half of the curd was salted about one hour sooner than the other half, which was allowed to develop the "velvety feel." The table shows the main points of the experiments.

Conclusions.

1. The yield of cheese per 100 pounds of milk was slightly greater by salting one hour before the curds became "velvety."

2. The loss of fat in pressings and drippings was slightly greater by allowing the curds to "mellow down" before salting.

3. There was not much difference in the quality of the cheese whether salted early or late, what difference there was being in favor of mellowing the curds before salting.

Effect of Salting at Different Periods

Date.	Lbs. of milk.	Per cent. fat in milk.	Time from dipping to salting.	Lbs. cheese.		Lbs. cur'd cheese per 100 lbs. milk.	Lbs. drippings and pressings.	Per cent. fat in drippings and pressings.	Score.						Total second score.
				Green.	Cured.				Flavor.	Closeness	Even color	Texture.	Finish.	Total.	
			h.m.												
April 28	1,200	3.60	2.05	60.25	58.25	9.70	7.00	1.30	29	19	13	17	10	88	....
	.....	.....	2.48	58.50	57.00	9.50	7.50	1.30	30	19	13	18	10	90	....
" 29	1,200	3.50	1.58	59 75	57.75	9.62	6.75	1.80	30	19	13	17	10	89	....
	.....	.....	2.40	59.50	57.25	9 62	7.00	1.80	29	19	13	16	10	87	....
" 30	1,200	3.40	2.15	59 00	57.00	9.50	6.00	1.00	32	18	15	19	10	94	88
	....	.....	3.25	58.50	56.50	9.41	6 00	1.20	32	19	15	19	10	95	87
May 1	1,200	3.60	2.06	58.50	56.50	9.41	7.00	1.00	32	18	14	18	10	92	87
	.....	.....	2.46	58.00	56.00	9.33	7.50	1.30	32	18	14	18	10	92	89
June 19	1,200	3.50	2.55	56.25	54.25	9.04	5.50	1.60	29	17	14	15	10	85	....
	....	.	3.43	56.25	54.25	9.04	5.00	1.50	29	18	14	16	10	87	....
" 21	1,200	3.40	2.05	60.00	57.75	9.62	5.00	.90	30	18	13	17	10	88	....
	.....	.....	2.55	59.00	57.00	9 50	5.00	.90	30	18	12	16	10	86	....
" 23	1,200	3.30	2.23	57.50	55.25	9.20	4.00	1.20	29	18	14	18	10	89	....
	....	.....	2.58	57.25	55.00	9.16	4.00	1.20	30	18	14	17	10	89	....
" 25	1,200	3.30	2.20	56.50	54.75	9.12	4.00	.80	30	18	14	18	10	90	85
	.....	.....	3.10	56.75	55.25	9.20	4.00	.80	28	18	14	18	10	88	89
Sept. 9	1,200	3.30	2.30	60.00	58.00	9 66	7.75	1.70	28	16	14	17	10	85	....
	.....	.....	3.20	59.00	57.00	9.50	8.00	1 90	30	17	14	17	10	88	....
" 10	1,200	3.30	2.40	58.50	56.50	9.41	5.75	1.00	30	18	14	17	10	89	....
	.....	....	3.53	57.50	55.50	9.25	6.00	1.30	32	17	14	18	10	91	....
" 11	1,200	3.50	2.15	59.25	57.50	9 58	8.00	1.00	31	15	14	17	10	88	....
	....	. ..	3.45	58.50	56.50	9.41	8.00	1.00	31	16	14	17	10	88	....
" 13	1,200	3.40	2 18	61.00	59.00	9.83	8 00	1 00	32	16	14	17	10	89	....
	.....	.....	3 22	60.00	58.00	9.66	8.50	1.00	31	17	14	17	10	89	....
" 25	1.200	3.40	2.15	64 00	62.00	10 33	6.75	.90	32	18	14	18	10	92	....
	.....	.....	3.20	62 75	61.00	10.16	7.25	1.20	31	18	14	18	18	91	....
Oct. 11	1,200	3.70	2.17	67 50	65.00	10 83	6.50	1.00	31	18	14	17	10	90	....
	...	.....	3.27	65.50	64.00	10.66	7.75	1.20	31	17	14	18	10	90	....
" 12	1,200	3.50	2.12	63.25	61.50	10.25	7.25	1.00	30	18	14	18	10	90	....
	.....	.....	3.10	61.75	60.00	10 00	7.50	.90	32	18	14	18	10	92	....
Averages	....	Salted early		.....	.....	9.67	6.35	1.14	30.3	17.6	13.8	17.3	10	89 2	....
	....	Salted late		.....	....	9.56	6 60	1.23	30.5	17.8	13.8	17.4	10	89.5	....

Temperature of Curds at Time of Putting to Press.

These are experiments conducted for the third year. Some time before pressing a curd was divided and put to press at different temperatures, as shown in the table. The range of temperature was from sixty-two degrees to ninety-five degrees at the time of hooping. The highest scoring cheese was made from a curd put to press at ninety-three degrees. Last year there was more openness in the cheese put to press at a high temperature. This difference did not seem to be so marked this year.

So long as the press room is kept moderately warm, there does not seem to be much difference in the quality of the cheese whether put to press at 65 degrees or 95 degrees, or at any temperature between these two points.

TABLE SHOWING EFFECT OF TEMPERATURE OF CURD WHEN PUT TO PRESS.

Date.	Lbs. of milk.	Per cent. fat in milk.	Lbs. cheese.		Temperature when put to press.	Scoring of cheese.					
			Green.	Cured.		Flavor.	Closeness.	Even color	Texture.	Finish.	Total.
April 14	1,200	3.70	62.50	60 00	62°	31	19	14	18	10	92
	.....	.... .	61.00	59.00	80°	31	18	13	18	10	90
" 9	1,200	3.60	62 25	60.00	63°	32	18	14	18	10	92
	....	.....	60.75	58.50	75°	32	19	14	18	10	93
" 12	1,200	3.50	62.50	60.00	65°	32	19	13	18	10	92
	.... .	.....	60.75	59.00	79°	31	18	13	18	10	90
" 8	1,200	3.60	62.25	60 00	66°	30	18	13	16	10	87
	.....	.....	60 50	58.50	80°	31	19	13	17	10	90
" 10	1,200	3.60	64 00	62 00	66°	32	19	14	18	10	93
	.....	.....	63.00	61.00	82°	33	19	15	18	10	95
" 7	1,200	3 80	61 50	59.50	68°	32	18	14	18	10	92
	.....	.....	60.50	58.50	80°	33	18	14	18	10	93
Aug. 3	1,200	3.40	55 50	53 75	93°	32	19	14	19	10	94
	... ..	.....	56.50	54.50	83°	28	19	14	18	10	89
Oct. 27	600	3.80	31.25	30.00	95°	32	18	14	17	10	91
	.....		32.00	30.50	82°	32	18	14	18	10	92
" 28	600	3.80	31.50	30.00	95°	31	17	14	17	10	89
	.....	.....	32.50	31.00	78°	30	17	14	18	10	89

EXPERIMENTS IN BUTTERMAKING.

The experiments in the Butter Department, in charge of Mr. T. C. Rogers, relate to the following: Effects of feeding silage and turnips on the quality of butter; period of lactation on creaming of milk and quality of butter; straining milk through broken ice before setting; milking machine milk for butter-making; pasteurizing milk and cream; best temperature for ripening cream; percentage of starter to use in cream-ripening; washing butter; moisture in butter; centrifugal dryer in butter-making.

Other experiments were made, but not in sufficient number to base definite conclusions upon them, as follows: Cultures supplied by Mr. Harrison which gave a very bad flavor to the cream and butter; butter made from hay and mangels, together with meal, but our mangels were all fed before sufficient data was collected to be of much use; rye and alfalfa fed to cows by Mr. Day—but one churning, in which the butter was of fair quality—that from the green rye averaging slightly better in the two scorings—though the alfalfa butter scored higher when first made; testing the double-necked bottles used for determining the fat in skim milk, by which it was found that a dozen of these bottles gave practically the same readings when tested with twelve different samples of skim milk on different days. What difference there was in the readings was probably due to some fat from the previous test not having been thoroughly washed out of the finely-graduated neck.

FEEDING SILAGE TO COWS.

A correspondent wrote as follows in reference to an experiment in feeding silage to milch cows:

"You doubtless often receive suggestions, *re* experiments that are not workable, and what I shall mention may possibly fall into the same category.

"Admittedly, flavor and keeping qualities are two of the strongest points of excellence to be secured in butter-making. One of the stock objections to ensilage (and which we frequently hear) has been raised on both scores, and no later than a couple of days ago a leading farmer and breeder from a northern county expressed himself very strongly to me on that subject. He was sure that a creamery near him was going to lose its reputation for fine butter, because the patrons so generally were feeding ensilage to their cows. Now, could you not carry through an experiment that would determine what there is (if anything) in the objection raised against ensilage? Three lots of cows might be selected —one put on a heavy (fifty or sixty pounds) ration of ensilage, with comparatively little or nothing else; a second lot on about one-half the amount of ensilage, and more of other foods; and the third, no ensilage, but, say mangels and other foods, sufficient to make a good ration.

"After feeding the respective rations for a period sufficiently long to render the milk normal under these rations, then have the milk made up separately into butter, and, after being stored six weeks or a couple of months, have them submitted to some reliable dairy commission-house, or three chosen butter experts, for judgment."

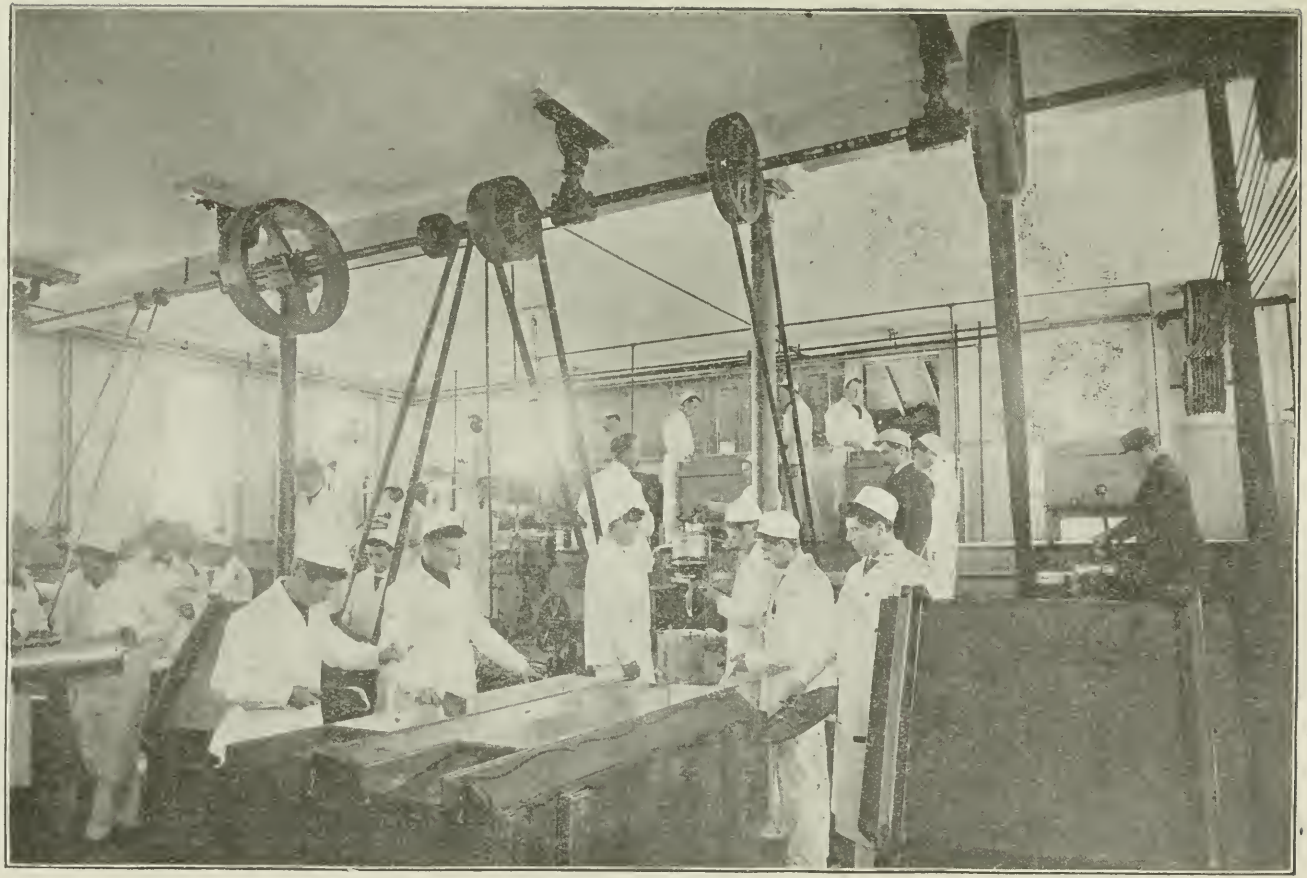
An experiment along the line of these suggestions was begun May 6th, and concluded May 26th, while the cows were still in the stable and the conditions favourable for the tainting of milk by ensilage feeding. The cows in the herd (20 in number) which were milking at this time, were divided into two lots—one lot on each side of the stable. To one lot was fed all the silage that they would eat clean, without making the manure too soft. They began on about thirty pounds each per day, and the amount was increased gradually until some of the cows were receiving fifty to sixty pounds each per day. In addition, they had some whole hay at noon, and eight pounds of meal mixed with the corn silage.

The other half of the cows received the regular ration of silage (thirty-five pounds) mixed with cut clover hay (ten to twelve pounds), mangels ($\frac{1}{3}$ bushel), and eight pounds of meal. The meal of both lots consisted of equal parts by weight of bran, peas, oats, and oil-cake.

Altogether thirteen different churnings were made. Of the silage milk 3,248 pounds were creamed and churned; while, of the mixed feed milk, 2,207 pounds of milk were made into butter. The average percentage of fat in the silage cream was 27.1, while the other contained 28.9. The temperature for churning the silage cream ranged from 55° to 61°, and averaged 57°. The mixed-feed cream ranged from 54° to 61°, and averaged 57°. The former churned, in an average of 33 5 minutes, while the latter required 42°. The butter, when made, was examined by myself and the butter-maker, and we considered that the butter made from silage milk was good in every respect. It was fully equal to that produced from mixed feed, in our judgment. When about one month old all the samples were scored by Mr. George Brill, of Guelph. When over two months old (July 30th) he scored them again. A few of the first lots were scored when made about one week.

Scoring of Butter from Silage and Mixed Feed Milk.

Scoring.	Silage Butter.			Mixed Feed Butter.		
	Flavor.	Grain.	Total Score.	Flavor.	Grain.	Total Score.
First	39.0	23.4	91.3	39.8	23.4	92.0
Last	35.6	23.0	87.0	36.8	23.0	88.2
Average of all	37.7	23.2	89.7	38.6	23.2	90.4



Making Butter at Dairy School, O. A. C., Guelph.

Conclusions.

1. The cream from silage feed churned more easily than that from mixed feed.

2. The highest score for flavor was forty-two points out of a possible forty-five. Two lots of silage butter scored forty-two, and three lots of the other scored this number. In grain, twenty-four points was the highest score obtained from a possible twenty-five. The silage butter scored twenty-four six times, and the mixed feed butter twenty-four five times. According to the judgment of the expert, the flavor of the butter was slightly better from the mixed feed (eight-tenths of a point in the average of thirteen trials), and it also held its flavor slightly better. The mixed-feed butter lost 2 points by keeping one month in an ordinary cool room, while the silage butter lost 3.4 points in flavor by keeping.

We can recommend good corn silage for feeding cows to produce milk for butter-making, but would prefer having it mixed with other foods, rather than feeding it in large quantities by itself.

Effect on Milk and Butter of Feeding Turnips to Cows.

We have always advocated that it is unwise to feed turnips to cows giving milk, especially where such milk is being manufactured into commercial butter or cheese. For home use it may be all right for those who do not object to a "turnipy flavor."

An experiment was commenced February 8th, 1897, to get some further light on the question, and also to see if simply allowing cows to remain in a stable where turnips are fed, without receiving any turnips themselves, would taint milk. Six cows were selected from the dairy herd and divided into three groups—two in each group. Mr. Stonehouse, our instructor in the home dairy, had charge of the buttermaking. I quote his report on the experiment :

"I beg to submit my report of experiments to ascertain the effects on the flavor of butter made from milk where turnips had been fed, and also from milk of cows that had not been fed turnips, but were confined and milked in a stable, the atmosphere of which was strongly charged with the odor of turnips fed to fattening steers, and alongside of which the cows were tied and milked.

"No. 1 lot was fed turnips immediately before milking, No. 2 lot was fed turnips after milking, and No. 3 lot was put into the stable with the steers.

"The experiment continued for five weeks. During the first week lots 1 and 2 were fed one peck of turnips each per day and no taint of turnips could be detected in the milk from any of the cows. The butter made was scored by the instructors and students of the dairy school one week after it was made, and no one detected any taint of turnips upon it. The scoring indicated first-class butter.

"During the second week, lots 1 and 2 were fed one-half bushel of turnips to each cow per day, and the scoring of the butter was practically the same as the first week.

"During the third week, the amount of turnips was increased to three pecks per day to each cow in lots 1 and 2, and still the taint was scarcely perceptible upon the milk, although the butter from lot 1 (turnips fed before milking) showed a slight flavor of turnips.

"During the fourth week, the turnips were increased to one bushel per cow per day, and the milk from lot 1 gave a decided odor of turnips after being heated to 110°, but it could not be detected before heating. The flavor on the milk from lot 2 (turnips fed after milking) was not so readily detected as it was on the milk from lot 1, but the flavor developed in the cream of both lots, and at the time of ripening there seemed to be but little if any difference. The cream was gathered for three days from each lot, and kept at a temperature below 45°. At the commencement of the ripening process, lot 1 was heated to 65° and 20 per cent. of starter was added. Lot 2 was heated to 75° and

allowed to develop its own acid for 24 hours. At the time of churning, lot 1 gave a pleasant acid flavor, while lot 2 had developed a strong odor of turnips. The same flavors predominated in the butter, which was scored by the instructors and class on the fourth day after churning. Lot 2 was scored low on account of the turnipy flavor, while lot 1 (turnips fed before milking) showed no turnipy flavor, indicating that the twenty per cent. of starter added to the cream had overcome the turnip flavor.

"During the fifth week the tests from lot 3 were discontinued, as the butter from those cows during the four weeks had maintained its good qualities, notwithstanding the strong odor of turnips in the stable where the cows were kept. The six cows were then given all the turnips they would eat for a period of four days, and the cream was placed in one can at a temperature of 45°. Before ripening, the cream was divided into three equal parts, all of which gave a strong odor of turnips. The first lot was heated to 75°, and allowed to develop its own acid. Lot 2 was heated to 65° and 20 per cent. of starter was added to the cream. Lot 3 was pasteurized and 20 per cent. of starter was added. At the end of 24 hours all three lots were churned.

"The butter from the first lot was very strong with the flavor of turnips. Lot 2 was not so bad as No. 1, while lot 3 (pasteurized) showed no turnip flavor at all. This indicates that pasteurizing and adding a starter will overcome the turnipy flavors in milk and butter.

"During the first three weeks one pound of pasteurized starter was put into each cream can with the first gathering of the cream and allowed to develop acid slowly during the three days the cream was being gathered for a churning. This may have had some effect on the flavor of the butter."

This experiment opens up several practical and interesting questions in reference to feeding milch cows on turnips. Does it disprove the "Breathing Theory" of turnips tainting milk? Was there any real difference in the turnipy flavor of the milk from cows fed turnips *before* and *after* milking? Is it safe to feed a small quantity of turnips to cows? Had the quantities of one peck, two pecks or three pecks per cow per day been continued for a month or so, would they eventually have caused a flavors in the milk? What part does a "starter" play in overcoming the turnipy flavor in cream? Is pasteurizing an effectual cure for turnipy flavor?

Kind of cream.	Av. score in flavor. (Max. 45.)			Av. score in grain. (Max. 25.)			Av. total all. (Max. 100.)		
	1st time.	2nd.	Av. all.	1st	2nd.	Av. all.	1st.	2nd.	Av. all.
Cows fed turnips before milking	39	37	38	23	23	23	90.6	89.5	90
Cows fed after milking	37.8	35.8	36.8	22.2	22.6	22.4	88.4	87.2	87.8
Turnipy cream pasteurized	40.75	40.0	40 37	23.2	23.0	23.1	93 7	92.0	92.8
Turnipy cream not pasteurized, but a starter added	40.00	38.0	39.00	23.3	23.0	23.1	91.6	90.0	90.8
Turnipy cream allowed to ripen of itself	36.0	33.0	34.5	21.6	23.0	22.3	86.0	85.0	85.5

From April 6th to 27th, a further test of feeding cows on turnips was made. Some more trials were made to see the results of pasteurizing and the effects of a starter in turnipy cream. All the cows milking at the time were divided into two lots. One lot was

fed turnips *before* milking, the other lot turnips *after* milking. They were started on a small ration, and it was gradually increased until the cows were getting nearly one bushel per day. The butter made was scored by Mr. Brill when about a month old, and again when about two months old. The table shows the averages of the scores in flavor, grain and totals, together with the scoring of butter made from turnipy cream pasteurized, where starter was added and where such cream was allowed to ripen by itself. It will be noticed that pasteurization and the use of a starter improved the flavor very much.

Effect of Period of Lactation on Creaming of Milk and Quality of Butter.

This is a continuation of last year's work on this question. The cows were divided into three lots—those which had been milking over six months, those under six and over three, and those milking less than three months. All three lots of milk were set in the same creamer, under exactly the same conditions. The average percentage of fat in the milk of the fresh cows was 3.78. The average percentage of fat in the skim milk from these cows was 0.26. The second lot (those milking over three and under six months) averaged 3.68 per cent. of fat in the whole milk and 0.50 in the skim milk, or nearly double that of the fresh milkers. Lot three (milking over six months) averaged 4 28 per cent. of fat in whole milk and 0.51 in skim milk.

Kind.	Av. % fat in cream.	Av. % fat in buttermilk.	Av. temp. for churning.	Av. time required to churn.	Av. score of flavor (45).	Av. score of grain (25).	Av. of total scores (100).
				Min.			
Fresh milkers	19.48	0.17	58°	21	41.2	22.7	93.0
3 to 6 months	20.1	0.21	58°	28	40.6	22 6	92.2
Over 6 months	18.4	0.17	58°	31.5	39.6	22.1	90.7

Effect of Straining Milk Through Broken Ice Before Setting.

At a creamery meeting held in Barrie last June the question was asked whether it was better or not to strain milk through broken ice before setting in the creamer. As we had never made any experiments directly on that point, I was unable to answer the question definitely, but promised to do some experimental work in that connection and report the results to Mr. Thomas, the owner of the creamery. In June and July twelve trials were made by first mixing together 90 pounds of milk, one-third of which was strained through broken ice and then set in a creamer in ice water. The 30 pounds of milk melted about 3½ to 4 lbs. of ice, which, of course, went into the milk. The ice cooled the milk about 20 degrees as it passed through. The cream was removed at the end of about twelve hours, and it was found that the skim milk contained an average of 0 53 per cent. of fat without making corrections for the melted ice. Another third of the milk was set in the same creamer as the first, after adding 20 per cent. of cold water (58°), and it was skimmed at the same time as the previous lot. The average per cent. of fat in skim milk was 0.49 (no corrections for water) The balance of the milk was set in the same creamer in ice water, without the addition of either ice or water. The average per cent. of fat in the skim milk was 0 47.

Conclusion: It was no advantage to strain the milk through ice before setting, nor yet to add cold water to the milk. This accords with previous experiments where both hot and cold water were added before setting.

Milking Machine Compared with Hand Milking for Quality of Butter.

On certain days during the months of April, May, July and August, about half of the cows were milked with the Thistle machine, and the other half were milked by hand.

The milk was creamed and churned separately, and the butter was scored twice by Mr. Brill. As seen in the table, there was not so very much difference in the quality of butter when first made, but the machine butter spoiled, or went off in flavor, much more quickly:

Kind of butter.	Scoring.	Score in flavor (max.45)	Score in grain (max.25)	Average of total scored max. 100.
Milking machine	1st time	39.0	23.	91.4
	2nd time	32.7	23.	84.7
	Average of all	35.85	23.	88.1
Hand milking	1st time	40.0	22.6	91.4
	2nd time	36 0	22.5	87.5
	Average of all	38.0	22.6	89.5

Pasteurizing Milk for Butter Making.

It has been suggested that pasteurizing the whole milk *before* separating was preferable to heating the cream and skim milk *after* separating. To see what advantage, if any, may be derived from heating the whole milk, and also to see what difficulties there may be in thus treating the milk before separating, several trials were made in October. A vat of milk was heated to a temperature ranging from 95° to 98° (av. 97°), and half of it was separated. The other half was then heated from 150° to 160° (av. 158°), and separated. All the heating was done in a vat having a capacity of about 800 pounds. The chief difficulty was in preventing the milk from cooking on the sides of the vat. By carefully regulating the steam, and by keeping the milk in motion, this trouble can be largely prevented. A channel vat having a double bottom, and set in another pan heated with a steam pipe, is the best method we have yet tried. The pasteurizers on the market are too expensive and too complicated for the average creamery.

It was found that the cream was richer from the milk heated to 158°, and the feed had to be increased in order to prevent the cream outlet from clogging. The extra feeding did not increase the loss of fat in skim milk. All our experience goes to show that the capacity of a separator is increased, and that it will skim closer by heating the milk to 100° or over before skimming.

In churning the cream from the two temperatures for heating, it was found that the cream from pasteurized milk churned in a little less time (average 3 minutes) and with less loss of fat in the buttermilk —0.13 per cent. as compared 0.19 in the buttermilk from unpasteurized milk.

Both lots of cream had the same percentage of starter added, were ripened at the same temperature, and were handled in much the same manner, except in the heating of the milk.

The table shows the quality of the butter.

Butter made from—	Scoring.	Flavor (max. 45.)	Grain (max. 25.)	Total (max. 100.)
Pasteurized milk	1st score	41.5	23.8	93.3
Raw milk	2nd score	40.7	22.7	92.0

Conclusions: With a proper system of heating the milk, pasteurizing the milk may be successfully done. It will increase the capacity of the separator, give closer skimming, and insure a better quality of cream and skim-milk (pasteurizing the cream and skim-milk would insure good cream and skim-milk.)

The quality of the butter is better where pasteurization is practised. The difference is not so marked when cows are on grass, but in winter, when cows are kept in the stable and fed foods which are liable to taint the milk, pasteurizing the milk or cream will show a marked improvement in the flavor of the butter. If the cream is properly cooled for a sufficient length of time before churning, the grain of the butter will be all right.

Pasteurized Cream.

The method of pasteurizing was that reported last year, viz., heating the cream in shot gun cans placed in a tank of hot water (180°). Twenty trials were made during the season. The average percentage of fat in the cream was 27. The churning temperature was 48.6° and the time required to churn averaged 36 minutes. The loss of fat in buttermilk averaged 0.15 per cent.

Twenty lots of the same cream were ripened without pasteurizing. The time required to churn was 39 minutes and the loss of fat in buttermilk averaged 0.16 per cent.

Kind of cream.	Scoring.	Flavor. (Max. 45)	Grain. (Max. 25.)	Total score. (Max. 100.)
Pasteurized	First	40.1	22.85	92.05
	Second	39.3	22 63	90.84
	Average	39.7	22.74	91.49
Raw	First	39.2	22.6	90.85
	Second	37.85	22.4	88.95
	Average	38.52	22.5	89.90
Pasteurized in tank	First	39.77	23.15	92.
	Second	36.77	22.15	88.
	Average	38.27	22.65	90.
Pasteurized in C. C. & G. pasteurizer	First	39.61	22.84	91.46
	Second	36.70	22 46	88.07
	Average	38.15	22.65	89.76

Moisture in Butter.

During the year forty-eight samples of butter were sent from the Dairy Department to the Chemical Laboratory to have the percentage of moisture determined. Very little work has been done in this connection with reference to Canadian butter. If the butter made in our dairy be a fair sample of average Canadian butter, the percentage of moisture is below that of European or United States butter. The average moisture in fourteen samples selected at random from our regular make, was 11.297 per cent. The average of the forty-eight samples was 11.034 per cent. of moisture. This is an indication that Canadians do not "load" their butter with water, and ought to be a point in favor of Canadian butter in the markets of Great Britain.

Several trials were made with a centrifugal butter dryer, in order to see its effect on the percentage of moisture retained in the butter. The dryer left an average of 9.402 per cent. of moisture in the butter treated with it, while lots of the same butter handled in the ordinary way contained 10.125 per cent. of water.

Temperature for Ripening Cream.

These experiments are a continuation of last year's work. Twenty-one trials were made by dividing cream into two lots after mixing thoroughly. One lot was ripened at

an average temperature of 73°, while the other lot was ripened at 60°. The time required to churn the cream ripened at 73° was 37 minutes and the percentage of fat in the buttermilk averagd 0.15. Of the 21 churnings of cream ripened at 60°, the average time required to churn was 33 minutes, and the fat lost in buttermilk averaged 0.165 per cent.

The table shows the effect on the quality of the butter, also the quality of the butter in seven trials where the cream was mixed and then divided into three lots ripened at 74°, 60°, and the third lot cooled to 49° for one to two hours and then warmed to 60° for ripening.

Cream ripened at		Flavor. (Max. 45.)	Grain. (Max. 25.)	Total. (Max. 100.)
73°	First score	45.	22.8	92.1
	Second score	39.	23.0	91.0
	Average of all	39.5	22.9	91.5
60°	First score	40.3	23.1	93.0
	Second score	38.4	23.1	90.5
	Average of all	39.35	23.1	91.7
74°	First score	39.86	23.0	91.2
	Second score	39.66	23.5	91.7
	Average score	39.76	23.25	91.75
60°	First score	40.4	23.1	92.0
	Second score	38.7	23.3	90.8
	Average score	39.55	23.2	91.4
Cooled to 49° and ripened at 60°.	First score	40.8	23.3	93.3
	Second score	37.7	22.8	89.0
	Average score	39.25	23.05	91.1

Different Percentages of Starter Used to Ripen Cream.

There is some difference of opinion among butter makers as to what percentage of starter added to cream will give the best results in ripening. Some say 5 per cent. or less, and some recommend 20 per cent. of starter in order to get the best flavor in the cream and butter, and also to get exhaustive churning.

Thirteen trials were made with percentages of starter varying from 3 to 10—average 6.4. The cream contained an average of 27 per cent. butter fat, and required 37.4 minutes to churn at an average temperature of 49.6°. The loss of fat in buttermilk was 0.2 per cent.

In thirteen trials, where the percentage of starter averaged 11 and the per cent. of fat in the cream was 26.6, it took 38.7 minutes to churn at an average temperature of 50°. The loss of fat in the buttermilk was 0.22 per cent.

The table shows the scoring of the butter from the two lots :

Kind of cream	Scoring.	Flavor. (Max. 45)	Grain. (Max. 25)	Total. (Max. 100)
6.4 % starter	First	40.54	22.6	92.2
	Second	38.80	22.8	90.4
	Average	39.62	22.7	91.3
11 % starter	First	41.0	22.6	92.4
	Second	37.9	22.6	89.6
	Average	39.45	22.6	91.55

Effect of Washing Butter.

This is work continued for three years. Eighteen trials were made during the season. The method of conducting the experiments was similar to that of other years, viz.: When a churning was completed one-third was taken from the churn, salted, and worked. The remainder was worked once, and half of it removed from the churn and finished. The balance was washed twice, and then treated the same as the other two lots. The butter was kept in an ordinary cool room and was scored twice—once soon after being made and once when a month to two months old.

The table shows the results of the scoring:

Kind of butter.	Scoring.	Flavor. (Max. 45.)	Grain. (Max. 25.)	Total. (Max. 100.)
Unwashed	First	40.5	23.2	92.9
	Second	38.8	23.0	91.27
	Average	39.65	23.1	92.08
Washed once	First	40.66	23.44	93.55
	Second	39.40	23.00	91.50
	Average	40.03	23.22	92.52
Washed twice	First	40.4	23.47	93.2
	Second	38.9	23.00	90.9
	Average	39.65	23.23	92.05

Quality of Butter made with Centrifugal Dryer.

Butter made with the dryer was compared with that made according to the ordinary methods of handling it and the effects on quality were noted. The dryer was used as follows: Half the butter from a churning was put into the machine and made to revolve until no more moisture came from the butter. It was then removed, salted, and worked as usual, except that not quite so much salt was added to the dried butter. The other half of the churning was salted and worked in the ordinary way.

The table shows the effect on the quality of the butter, which was practically the same from both methods:

Kind of butter.	Scoring.	Av. flavor. (Max. 45.)	Av. grain. (Max. 25.)	Av. total. (Max. 100.)
Ordinary method	1st score.	41.62	22.36	93.0
	2nd "	38.12	22.75	89.9
	Average	39.87	22.55	91.4
Centrigugal Dryer	1st score.	41.75	22.62	93.25
	2nd "	38.14	22.82	90.14
	Average	39.94	22.72	91 69

DAIRY SCHOOL.

Previous to the dairy course last January, the College students took two weeks' work in the dairy under instruction from the heads of the different departments of the Dairy School. The Dairy School proper opened January 15th and closed March 26th. Thirty-nine students wrote on the final examinations, of whom thirty-four passed, and were granted their certificates of standing. The work was much the same as in former years—lectures, discussions, judging cheese and butter, along with practical work in cheese-making, running of cream separator, buttermaking and milk-testing. The butter and cheese made during the term were sold for good prices—chiefly in the local markets.

For 1898 we have added a lady instructor to the Home Dairy School staff, in order to induce a larger number of ladies to attend. We have also extended the course to twelve weeks. This will give more time for practical lessons in the dairy, and our graduates will be more fully equipped with the practical knowledge necessary to succeed in the creamery or cheese factory.

Diplomas —The following are applying for diplomas this year: A. E. Gracey, Trafalgar; Geo. Menzies, Sheffield; James Biffin, Bennington; W. M. Singleton, Newboro'. If there are no unfavorable reports at the first meeting of the Dairy School Instructors of 1898 their diplomas will be granted.

DAIRY STOCK.

Our stock, during the year, consisted of cows, pigs, and one horse. In the latter part of the year the dairy piggery was placed in charge of Mr. Day to conduct experiments. This will relieve the dairy department of the need to keep a large number of hogs to consume dairy by products, as Mr. Day has agreed to take these. The dairy will lose about $500 revenue per year by this change.

The dairy herd consists of five Jersey cows, three Holsteins, three Ayrshires, twenty grade cows and heifers, three Holstein calves, and one grade calf. At the annual sale three Jersey bull calves and one Holstein bull calf were sold. An Ayrshire bull calf was disposed of later, privately.

During the past year an approximate account of feed fed to each cow was kept by the cattleman. As in previous years each cow's milk was weighed morning and evening, and a weekly composite sample was taken and tested at the dairy. At the end of each month the cost of food given, together with the pounds of milk, butter and cheese produced by each cow was recorded. As our herd is continually changing we give the records for those only which have been in the herd for the *full* year.

The foods fed, which were furnished by the farm department, were charged as follows: Hay $6.00 per ton; silage $1.30 per ton; and mangles seven cents per bushel. The foods bought cost as follows, to which was added two-and-a-half cents per bushel for grinding the grains; Oats 20 cents per bushel; peas 42½ cents per bushel; bran $9.00 per ton; oil cake $19.00 per ton.

The same rules as last year were used for calculating the butter and cheese from the milk and butter fat, viz., ten per cent. was added to the butter fat in estimating the butter.

The pounds of butter were multiplied by two-and-a-quarter in estimating the cheese produced. The tables show the record of each cow which has been in the herd for a *full* year, and also the food, cost of milk, butter and cheese by months.

Record of Dairy Herd for 1896 and 1897.

Name of Cow.	Breed.	Total cost of food.		Pounds of milk.		Pounds of butter.		Pounds of cheese.		Food cost 1 gal. milk.		Food cost 1 lb. butter.		Food cost 1 lb. cheese.	
		1896	1897	1896	1897	1896	1897	1896	1897	1896	1897	1896	1897	1896	1897
		$ c.	$ c.												
Margaret	Holstein	39 89	27 98	7,994	9,131	312	335	702	753	5.0	3.06	12.7	8.35	5.6	3.71
Belle Temple	Jersey	37 50	29 32	6,702	5,907	424	360	954	810	5.6	4 96	8.8	8.14	3.9	3.62
Birdie	Grade	38 85	26 90	7,787	6,375	365	264	821	594	4.9	4 22	10.6	10.18	4.7	4.52
Annie	Grade	28 23	26 92	5,341	4,463	239	213	537	479	5.2	6 03	11 8	12.63	5.2	5.62
Lisgar's Rose	Jersey	30 94	23 92	5,865	3,730	325	189	731	425	5.2	6.41	9.5	12.65	4 2	5.62
Patience	Ayrshire	30 06	23 09	7,473	5,559	329	266	740	598	4 0	4 15	9.0	8.68	4.0	3 86
Mabel	Grade	32 55	26 78	5,683	7,581	235	290	528	652	5 7	3.53	13.8	9.23	6.1	4.10
Wedo	Holstein	19 90	28 52	3,434	6,617	119	238	293	536	5.8	4 31	16 7	11.98	6.8	5.32
Ontario Belle	Jersey	17 43	22 37	3,195	3,214	194	220	436	495	5 4	6.96	9.0	10.16	4.0	4.51
Rena Burnette	"	18 21	22 17	4,126	3,188	231	200	520	450	4.4	6 94	7.9	11 08	3.5	4.92
Lily X. Y	"	8 17	21 26	1,278	3,705	66	224	150	504	6.3	5.74	12.3	9.49	5.4	4 21
Meg	Holstein	.....	27 40	.....	4,442	.....	159	.....	397	....	6.17	....	17.23	...	6.90
Jennie	Grade	26 69	.....	4,028	.....	120	....	360	....	6.6	....	22 2	.....	7.4	....
Jessie	"	29 48	.....	3,780	.....	161	....	362	....	7 8	....	18 3	.....	8.1	....
Filpail	"	29 60	.....	5,006	.....	199	....	448	....	5.9	....	14.9	.....	6.6	....
Carrie	"	29 64	.....	3,979	.....	169	....	380	....	7.4	....	17.5	....	7.8	...
Minnie	"	24 36	.....	2,389	.....	133	...	300	...	10.1	....	18.2	.....	8.1	....

Food Cost of Milk, Butter and Cheese, from Dairy Herd, O.A.C., by Months, for 1896-97.

Month.	No. cows milking.		Total food cost.		Pounds of milk.		Pounds of butter.		Pounds of cheese.		Food cost of 1 gal. milk.		Food cost of 1 lb. butter.		Food cost of 1 lb. cheese.	
	1896	1897	1896	1897	1896	1897	1896	1897	1896	1897	1896	1897	1896	1897	1896	1897
			$ c.	$ c.							c.	c.	c.	c.	c.	c.
December	16	19	62 00	49 25	7,767	8,246	329	384	740	864	8 0	5 97	18.8	12.82	8.4	5.70
January	16	*19	43 60	58 33	7,043	10,609	317	466	713	1,152	6.2	5.50	14.0	11.39	6.1	5.06
February	*15	19	46 00	50 91	8,029	8,839	373	392	839	969	5.7	5.76	12.3	11.81	5.5	5.25
March	17	18	45 53	48 62	7,244	8,590	334	411	722	924	6.3	5 66	13.6	11.82	6.1	5.26
April	*18	16	48 40	40 59	10,487	7,033	463	308	1,041	693	4 6	5.77	10 4	13 17	4.6	5.85
May	*17	*20	33 09	65 46	11,665	13,178	490	590	1,102	1,327	2.8	4.97	6.7	11.09	3.0	4.93
June	21	22	23 73	32 57	11,664	13,240	568	551	1,278	1,239	2 0	2.46	4.2	5 91	1.8	2.62
July	22	22	37 65	50 88	10,245	12,277	454	486	1,021	1,093	3.7	2.51	8.3	6.35	3.7	2 82
August	24	*21	58 64	31 27	11,511	14,633	464	575	1,045	1,293	5.1	2.13	12.6	5 43	5.6	2 41
September	21	19	69 34	35 87	8,939	9,934	400	423	900	951	7.7	3.60	17.3	8.48	7.7	3 77
October	*22	20	73 65	31 63	10,205	9,653	479	403	1,077	906	7.2	3.27	15.3	7 84	6.8	3.49
November	20	*18	54 38	63 12	9,237	9,209	435	420	979	945	5.9	6.86	12.5	15.02	5.6	6.67
Averages	19.1	19.4	49 66	44 88	9,501	10,453	425	450	955	1,029	5.2	4.53	11.6	10.9	5.2	4.48

* Contains five weeks.

MISCELLANEOUS DAIRY NOTES.

Special Bulletins.—During the year three special bulletins, in suitable form for the newspapers of the Province, have been issued from the Dairy Department. We would like to make this a special feature of our work in order that dairymen may quickly receive the information contained in these bulletins. It requires the co-operation of the press to make the plan succeed.

In addition, a special bulletin was prepared on the methods of building and conducting co-operative cheese factories and creameries, which was published by the Department of Agriculture, Toronto.

Bulletin No. 1.—Fodder and Spring Cheese.

To Makers.—It will be well to bear in mind that the cheese made in the spring of 1897 are almost sure to go into immediate consumption. Other years, makers have been undecided whether to make the cheese for early use or make them "to be held." This year there can scarcely be any room for doubt as to when spring cheese will be needed. They are wanted now. With this fact before them, makers should govern themselves accordingly and make use of all their art in order to produce a "quick-curing" article To obtain this end observe the following points:

1. Accept nothing but pure, sweet milk.

2. Heat to 86 degrees and then make a rennet test.

3. Set the milk when the rennet test is about 18 seconds, or at sufficient ripeness so that the curd will "dip" in about two and a half hours.

4. Use sufficient rennet to coagulate the milk in about twenty minutes. This will require from three to four ounces of standard rennet. (Be sure that your rennet is all right).

5. Do not cut more than three times, unless the milk is over ripe. Retain plenty of moisture in spring curds for an early market. Our spring cheese are usually too dry and harsh.

6. Heat slowly to 98 degrees—not above this temperature, as it is desirable to retain moisture.

7. Dip at the first appearance of acid. If the acid does not show on the hot iron, use the alkali test. Do not leave the curd in the whey more than three hours, even if the hot iron indicates "no acid." If you test with the alkali, you will find plenty of acid at the end of three hours, provided the temperature is kept up to 98 degrees. The hot iron is not always reliable at this point.

8. Mill early—as soon as the curd becomes meaty and shows about one inch on the hot iron.

9. Hand-stir sufficiently to improve flavor, but not enough to lose all the moisture.

10. Salt at the rate of about two pounds to 1,000 pounds of milk and before the grease runs too freely. Allow the curds to stand longer in the salt. You will thus save butter fat and will not be troubled with "greasy" curds. Many are sacrificing a good deal of butter fat for the sake of getting a "close" cheese.

11. Keep the temperature of the curing room at about 70 degrees and thus hasten the curing.

12. Do not allow the cheese to go into the curing room which is not nicely finished, nor one to leave it until it is at least two weeks old. Not a few are ruining their reputation by shipping curd to their customers. The writer heard of a case this spring where cheese were made on Saturday and shipped the following Tuesday. Such a practice cannot be too strongly condemned. Don't do it, no matter what the pressure from salesmen,

buyers or patrons, who may be anxious to secure the advantage of the present high price. The reputation of Canadian cheese is at stake. I repeat, don't do it.

13. To sum up: in order to obtain fat, meaty, quick-curing cheese, which will be fit to eat in about one month after making, use plenty of good rennet; leave sufficient moisture in the curd; salt lightly; keep the temperature of the curing room up to 70 degrees, night and day; and keep the cheese in the curing room for at least two weeks.

In conclusion, take a little trouble to inform patrons as to the best methods of caring for milk. Do not send milk home without first trying to remedy the trouble. Pay a visit to each patron at least once a year. Keep the factory clean and tidy.

To Factory Owners.—Please see that the factory is in good repair before commencing the season's work. Have all holes in the floor made good. Look over the vats, presses, hoops, etc., carefully and put them in good shape for the maker. Tidy the yards and approaches to the factory. Plant some trees about the place. Make the factory a place where patrons will like to come, rather than a place to be shunned on account of bad smells, untidy surroundings, and an ill-tempered cheese-maker. Prizes given to patrons who send the best and largest quantity of milk will help the business.

To Patrons.—Endeavor to supply the factory with first-class milk. Take a pride in sending a large quantity of the best quality of milk that your section can produce. Strain and aerate the milk well. Deliver it at the factory every day, if possible. There is always more loss of fat in making up milk two or three days old. The maker is also likely to be troubled with greasy curds and other things which will give him difficulty in making fine cheese.

What the Trade says about Fodder Cheese.

Mr. W. A. Grant, of Montreal: "The statistical position of cheese in England to-day is the strongest for the past seventeen years. There are practically no English cheese, and the new Cheshire cheese, when I left England, on the 7th of April, was selling at 70 s. per cwt., or equal to 15c. per pound. Of course these prices will not be maintained. I am very glad that factorymen have seen it to their advantage to make as few fodder cheese as possible, and I hope those who have made them will keep them on the shelves until they are at least two or three weeks old, so that they will be cured and meaty when they are sent forward, as the cheese does not properly cure in the box."

Messrs. A. A. Ayer & Co., Montreal: "It is a great mistake to ship fodder cheese so very young All fodder cheese should be made soft, fat and quick-curing, as they are intended for immediate consumption. The present price is very tempting, and we fear lecturing the farmers under such circumstances will do very little good, at the same time, one's duty demands that they should warn the farmers in shipping cheese so very, very green. They are no credit to the country and are very apt to spoil, or rot in some instances."

Messrs. J. C. & G. D. Warrington, of Montreal, report that of 27 factories in Eastern Ontario, whose cheese had been inspected by them they found all to be clean in flavor, solid and close in cutting, and none showing signs of greasy curd or stable flavors.

Montreal *Trade Bulletin*, April 30th: "In this market we have just heard of the sale of a lot of the finest western colored at 10¼c., and two lots of finest white at 10c. and 10⅛c., respectively. Less desitable goods are quoted at 9c. to 9¾c.—a lot of French fodders, lean and hard, selling at the inside figure."

"The first few small lots of French fodders were received here a few days ago, but the quality was very disappointing, being, as a rule, lean, leatherly, and improperly cured, which sold for 9½c. to 9¾c."

Bulletin No. 2.—The Curing of Cheese.

When cheese enter the curing-room they are but half made. The proper curing of cheese is as important as the making. Temperature is the most important factor in the curing of well made cheese. The best temperature for curing cheese is from 60 to 70 degrees. Below 60 degrees too much moisture is retained near the outside, which causes

discoloration. uneven curing, and poor flavor. Above 70 degrees, evaporation takes place so rapidly that curing is retarded rather than hastened, as moisture is necessary for the ferments which cause ripening. There is also loss by cracking of the cheese, loss in weight, and loss of butter fat, when the temperature of the curing-room remains for any length of time above 70 degrees F. A prominent cheese buyer remarked recently, "that the loss by evaporation and loss of butter fat from cheese in one year in an ordinary cheese factory would pay the whole cost of storing ice, and the cost of suitable ice boxes or racks for cooling the curing-room during a hot spell. The arrangements for curing cheese are very deficient, and we have practically no means for controlling the temperature of curing-rooms in hot weather."

The usual plan of keeping cheese warm in cold weather is by the use of an ordinary wood stove. This is not a satisfactory method. A cheese one foot from an ordinary stove receives 100 times more heat than a cheese 10 feet away from the same stove. The point to be aimed at is to maintain an even temperature in all parts of the room night and day. Cheese should not be allowed to cool off at night; hence wood is not a suitable fuel to keep cheese at an even temperature.

The curing-room should be properly constructed, with paper and air spaces to assist in controlling temperature. The method of heating may be by steam, by hot water, or by a warm air process which will cause a circulation of the air in the room. At the Black Creek factory near Stratford, at the Strathallan factory, and possibly at others, thay use a furnace known as the "Alaska" (made by Burrow, Stewart & Milne, of Hamilton, Ont., which gives entire satisfaction. Mr. R. M. Ballantyne, speaking for the cheese buyers of Western Ontario, recommends this system as the best he has seen in use. The main features seem to be a heater surrounded by a galvanized iron casing, lined on the inside with asbestos and corrugated tin. It is so made that it allows a free circulation of air—cold air goes in at the bottom and warm air goes out at the top. The casing of the furnace should extend as high as the bottom of the highest cheese in the room (about 6½ or 7 feet from the floor), so that the warm air may be conducted *above* the cheese. The casing should be so made that no heat is radiated therefrom into the room or against the cheese near the furnace.

The wholesale prices of these furnaces are:

No. 20	(capacity 12,000 cubic feet).....	$35 00
No. 22	(" 17,000 " ").....	42 00
No. 24	(" 25,000 " ").....	52 00

The supply of ice should be stored during this winter for use next summer. To preserve ice it is not necessary to have an expensive building. Any sort of building which will shed water and allow the melted ice to flow away from the body of unmelted ice will answer the purpose, if it be properly packed in sawdust. Straw is of little use for packing ice. Use plenty of sawdust around and over the ice, and pack all openings between the blocks with broken ice. Now is the time to prepare for next summer's hot weather, and thus prevent loss of cheese. Store plenty of ice (8 to 10 cords for an ordinary factory) and use freely in hot weather.

There are several ways in which the ice may be used in the curing-room. In the curing-room at the O. A. C. dairy we use for holding the ice a large open pan made of galvanized iron, which sits on the upper shelves of a cheese rack. This pan is about 6ft. long, 2½ ft, wide, and 3 inches deep. In one corner is an inch hole, which is connected with piping to convey the melted ice ontside. This is a simple and effective method in a small curing-room.

For a larger curing-room with high ceilings, the plan adopted at the Black Creek factory is satisfactory. Ice boxes are suspended from the ceiling and supported by a cross piece from two of the uprights which are used for supporting the cheese shelves. The boxes are lined with galvanized iron on the sides and bottom, and form a trough in the centre to catch the drip, which is conveyed outside. In the boxes are racks for holding

the blocks of ice. These racks may be taken out at any time. The size of the racks is 3 ft. wide and 10 ft. long. There should be three or four of these in an ordinary curing-room 30 x 40.

Another way suggested by Mr. Ballantyne is to build a box, say 4 x 6x6. Have the box lined with galvanized iron, and open at top and bottom. Place the rack and ice in this box, and provide for the outflow of water. Or, in this box place galvanized iron cylinders, about 2 ft. in diameter, and fill them with broken ice and salt. In this way the temperature can be very quickly reduced.

The proper curing of cheese is so important a question that we trust makers and factory owners will give it the attention which its importance demands.

Bulletin No. 3.—The Winter Creamery.

The winter creamery offers many advantages to dairymen with few or many cows milking during the winter. The chief of these are a better average quality of butter, which is sure to bring a higher price, and the extra yield of butter per 100 pounds of milk which is got by using the cream separator. Either of these advantages will pay the cost of manufacturing the butter, which ought not to exceed three and one-half cents per pound where the milk is delivered at the creamery. Again, the labor is very much less for the farmer's wife where the milk is sent to the winter creamery. In addition, the farmer and his wife feel much better when going to town to buy household necessaries, if they have five to ten dollars in a pocket as a result of the sale of creamery butter, than if they have twenty to fifty pounds of butter in a basket.

Location.—The creamery may be located in a summer cream-gathering creamery, in a summer separator creamery, in a summer cheese factory, or in a place where there are none of these. If on average of 15,000 pounds of milk per week can be relied upon during the winter season, it will pay to purchase winter creamery apparatus and hire a butter maker. There is no reason why our cream-gathering creameries and cheese factories should hang out this sign about October 15th each year: "Gone out of business until May 1st. Patrons must make dairy butter and trade it at the corner grocery, until we open up again, or else manage a 'dry' dairy for the winter."

This ought not to be. The money lost through "dairy" butter, dry cows, and ignorance of the first principles of economic dairying, would pay the municipal taxes in every dairy township of the Province.

Machinery and Building.—The building should be made as warm as possible with paper and dead air spaces, and should, where practicable, be heated with "live" steam or with "exhaust" steam from the engine. A room 20 x 30 to 30 x 30 is required for making the butter, also an office, boiler and engine room, a refrigerator and an ice house —say 600 square feet of ground space for these latter.

The cost of the building will be from $1,000 to $1,200. The machinery to handle 15,000 to 25,000 pounds of milk weekly will cost about $1,000.

The leading makes of separators used in Canadian creameries are:

Alpha de Laval, sold by the Canadian Dairy Supply Co., Montreal.

Alexandra, sold by J. S. Pearce & Co., London, Ont.

Russian, sold by D. Derbyshire & Co., Brockville, Ont.

Danish Weston, sold by Richardson & Webster, St. Marys, Ont.

These separators cost from $350 to $550 each, depending upon the make and size. They all have their good points, and we do not care to recommend any one of them in preference to another. The agents will explain the good points of each and quote prices on application.

Next to the separator the most important part of the machinery is the boiler and engine. The boiler should have a capacity of from twelve to twenty horse-power, and

TESTING MILK AT DAIRY SCHOOL, O. A. C., GUELPH.

the engine from six to eight. A "half-trunk-lid" churn made of whitewood or pine is convenient. A narrow cream vat with plenty of space at the sides and ends for ice is needed to cool the cream rapidly where a cooler is not used.

Where the cream vat is not adapted to rapid cooling, one of the various coolers on the market may be used; or a coil of galvanized iron pipe having cold water running through it may be placed in the cream and be worked by the engine. This will cool the cream rapidly.

A Babcock tester for dividing proceeds among patrons and for detecting losses of butter fat in skim-milk and buttermilk, is an essential part of the machinery in every creamery.

A complete list of all machinery needed, together with their prices, may be obtained from any of the dairy supply firms.

To the Patrons.—Aim to have about half of the cows fresh for the winter creamery. Feed them liberally. Give the cows plenty of salt and water. Care for them regularly, treat them kindly, keep them clean and you will have your reward. We find that corn silage, mangels, clover hay, bran, peas, oats and some oil-cake, if it can be got for twenty dollars per ton or less, give us good results in the milk flow. Swede turnips or rape should not be fed to cows giving milk for butter or cheese-making.

Do not allow the milk to freeze or be exposed to any bad odor. Three times per week is often enough to deliver the milk at the winter creamery. Make arrangements with one or more of your neighbours to "take turns," hauling the milk and bringing back the skim-milk. This will lessen the labor. If the skim-milk is properly fed to calves and young pigs, it will pay for the hauling of the milk to, and the skim-milk from, the creamery. Our future dairy cows depend largely upon the judicious use of skim-milk.

Finally, help the butter-maker by supplying him with first-class milk, and you have your reward.

To the Butter Maker.—Be on your guard against stable, turnip, potato, brewer's grains, or other flavors which taint milk and injure the quality of butter. If the milk is frozen or very cold, you will have difficulty in detecting these flavors, and it will be safer for you to heat a small portion of such milk separately, where you suspect bad flavor. Where a can has much ice on the top, remove the ice before weighing and sampling, or else melt it before sampling, as the frozen part, containing an undue proportion of water, will not allow you to take a fair sample.

To preserve the milk for testing, use in each composite bottle about what will lie on a ten cent piece, a mixture of seven parts bi-chromate of potash and one part corrosive sublimate. Once a month is often enough to do the testing. Test very carefully and exactly, so as to render to each patron his just reward for labor done in caring for his cows and milk.

Look over the machinery each evening to see that it is in good condition for the morning run and thus avoid delays to patrons.

Heat the milk from 100 to 130 degrees before separating. The higher temperature will increase the capacity of your separator and enable it to skim more closely. It will also give smoother cream with some separators. Speed the separator to its full rate and maintain it at full speed during the whole skimming. (It is economy to use the exhaust steam for heating the whole milk or the skim-milk). Use hot water for heating rather than "dry" steam, and the milk will not cook on your heater so much. (To remove cooked milk from heater or vat, add some washing soda to warm water and allow it to stand in the heater for some time before washing). Aim to have about twenty-five to thirty per cent. of fat in the cream. If the milk requires to be lifted to the separator use a pump which may be easily cleaned, in preference to an ejector.

To insure a uniform flavor of good quality, we recommend the system known as pasteurizing. Either pasteurize the whole milk before separating, or heat the cream and skim-milk after separating. For heating the whole milk a channel heater about eight or

ten inches deep with six or seven channels about four feet long and three to four inches wide would answer the purpose after a portion of the heating has been done in the receiving vat. Place this channel vat in a tank or pan with a steam pipe under it for heating the water. The milk or cream enters one side and passes out at the other, having been heated to 160 degrees on the way. Keep the cream covered by means of a tin cover placed over the channel vat. The cream may be pasteurized in one of four ways:

(1) By using ordinary shot gun cans (8 in. diameter by 20 in. deep) set in a tank of water kept at about 180 degrees. Keep the cream stirred all the time it is heating and when it reaches 160 degrees remove the can from the water. Allow it to stand for twenty minutes, then empty into the cream vat and begin the cooling.

(2) By the use of a smaller channel vat, similar to the one described for pasteurizing whole milk. Size, three feet long, twenty inches wide, three inches deep, with six or seven channels. This is the least labor and expense.

(3) By heating the cream in the ordinary cream vat.

(4) By means of a pasteurizer, which is a machine specially built for the purpose of heating milk or cream.

(For ordinary creamery work, pasteurizing the cream is likely to be more practicable than heating the whole milk).

The next step is the cooling of the cream. It should be cooled to about ninety to ninety-five degrees (after pasteurizing) and then the "starter" should be added. (We recommend making the starter from pasteurized skim-milk, and using the same cultures as far as possible during the winter, thus insuring uniformity of flavor during the whole season).

Use from ten to twenty per cent. of starter when ripening in twenty-four hours, and about five per cent. when ripening in forty-eight hours. (If pasteurizing is not practised the starter may be added to the cream vat as soon as, or before, the cream is put in). Continue the cooling until the cream reaches a temperature of sixty-five to seventy degrees, when it should be allowed to stand until the acid begins to develop quite strongly and thickening commences. The cream should then be cooled to churning temperature, which will be from fifty degrees to fifty-five degrees. This may be done in the evening and during the night. To insure good grain and body in the butter, be sure to cool the cream to churning temperature for two to four hours before churning, to allow the fat to harden. When ripening at a high temperature (seventy degrees) allow the cream to remain over night at churning temperature, if at all possible.

Use the alkali test for determining the acidity of the cream the first thing in the morning. If there is from six to seven-tenths of a per cent. of acid present, the cream is ready for churning. Do not allow over eight-tenths of a per cent. of acid in the cream if you wish the finest flavor in the butter.

The square box churn, or the combined churn and worker, will give good results. If the butter is for export to Great Britain, use little or no coloring in the cream. Have the temperature of the cream such that the butter will come in granular form in forty to sixty minutes. After drawing off the buttermilk, wash very lightly for quick consumption, and once for the regular trade. Salt at the rate of about one-half ounce per pound of butter for export, and three-quarters of an ounce to one ounce for home market. Work the butter until the salt is thoroughly mixed through it, the color is even, and until the water is not more than twelve per cent. of the finished butter.

For the home market there is no form more suitable than the oblong print, wrapped in good parchment paper which is stamped with the name of the creamery. For export, use the square box lined with paraffine wax and parchment paper. Pack the butter in the box firmly, so that when emptied it will look like a solid cube of butter, without holes into which gather the brine and buttermilk, giving the butter an unsightly appearance.

Ship the butter weekly to a reliable commission house, or directly to exporters or importers of the finest Canadian creamery butter, thus building up for our butter branch of the dairy industry a reputation similar to that which Canadian cheese has acquired.

The winter creamery is a branch of dairying which needs and is capable of almost unlimited extension.

Milk Tests.

Liberal prizes were given under this head at the Victorian Era Exposition, at Toronto, and at the Southern Fair, Brantford. I took charge of these tests. The conditions were much the same as last year. Most of those competing at Toronto milked their cows three times per day. Only one exhibitor did so at Brantford. An American breeder of Holsteins had competing cows in the test at Toronto. Five Canadian cows were ahead of the best American cow in the test. This speaks well for the skill of Canadian breeders and feeders. Nineteen cows entered, and twelve finished the test.

The results of the test at Toronto are :

Rank.	Name of Cow.	Breed	Owner.	Lbs. milk in two days.	Lbs. butter fat in two days.	Lbs. milk solids in two days.
1.	Carmen Sylva	Holstein	Gilray & Son	133.25	3.849	15.380
2.	Emery Queen	"	Hoover & Son	133.00	3.624	14.958
3.	Emery Beauty	"	"	127.00	3.752	14.365
4.	Edgely Mol	"	"	127.75	3.108	13.812
5.	Edgely Frena	"	"	116 50	3.621	13.723
6.	Korndyke Queen	"	Stevens & Son, N.Y	113.75	3.137	12.422
7.	Helena Burke	"	" "	108·50	3.015	11.966
8.	Lida 4th	"	Ellis Bros	110 50	2.710	11.692
9.	Aggie Grace 2nd's Pietertje	"	Stevens & Son	96 75	3.209	11.376
10.	Rose	"	G. W. Clemons	103.50	2.817	11.093
11.	Artis	"	"	90.75	2.385	9.915
12.	Lady of Glen Rouge	Jersey	W. Rolph	70 50	3.297	9.692

At the Southern Fair, there were eight cows competing in two classes—one open only to those whose milk had been sent to a cheese factory for a part of the season, and the other class open to all.

Class.	Rank.	Name of Cow.	Breed.	Owner.	Lbs. milk in 24 hours.	Lbs. fat in 24 hours.	Lbs. solids not fat in 24 hours.	Total score.
Open to factory cows.	1.	Edgely Frena	Holstein	A. & G. Rice	59 00	1 883	5.169	136.74
	2.	Roany	Grade shorthorn	J. R. Alexander	45 00	1.602	4.069	108 72
	3.	Gertie	Ayrshire	W. M. & J. C. Smith	26.75	0.917	2.652	70 70
Open to all.	1.	Sunbeam	Jersey	R. H. Bull & Son	29.75	1.591	2.663	96 82
	2.	Maud	Grade Holstein	Wm. Brittain	33.00	1.437	2.819	91.72
	3.	Annie Laurie	Ayrshire	W. M. & J. C. Smith	32 00	1.189	2.829	84.50
	4.	Daisy Texal 2nd.	Holstein	A. & G. Rice	38.50	0 943	3.174	82.46

While the prizes at Toronto were given to the cows producing the largest quantity of milk solids in two days, the basis of award at Brantford was the following scale of points :

20 points for conformation.
1 point " each pound of milk.
20 points " " of butter fat.
4 points " " of solids not fat.
1 point " ten days in milk after the first ten days.
10 points to be deducted for each per cent. of fat below three.

The test continued for twenty-four hours on September 23rd. Eight cows entered, and seven completed the period of testing.

Square Cheese.

During the dairy school and early in the spring, we made a number of square cheese to continue our tests of last year. We forwarded these to London, England, through two firms of cheese buyers in this country. Both lots brought satisfactory prices, but the buyers report that the shape was not suitable for the London trade.

The Hon. Thos. Ballantyne and Sons, through whom one lot was forwarded, received the following note from Messrs. Lovell and Christmas, West Smithfield, London, England.

" With regard to the square cheese, the quality was everything that could be desired, but we do not think that this shape would take with the public here. The only point we can see in their favor is, that they would take up less space, and even this would not be altogether beneficial, as when the cheese were packed closely together no air would get between them, and it is sometimes an advantage to have the air circulating among the cheese."

The Milking Machine.

Early in the year you had fitted up for us a rope-drive from the engine at the dairy to connect with the Thistle milking machine at the dairy barn. From various causes the drive did not work properly and caused a great deal of trouble, until finally it gave out altogether, and we have been unable to use it since the middle of the summer.

As to the machine and its work, we would say that it milked the cows clean, and, after a few times' use, nearly all of the cows seemed to enjoy being milked by it, as well as by hand. The greatest trouble we had was with the flavor of the milk. The pipes through which the air is forced by the machine become very foul from the milk drawn into them whenever a cup drops from a teat. I believe that this difficulty has been remedied; but so far the firm has not supplied us with the necessary attachments to prevent this tainting of the milk.

In reference to its practicability for average dairymen, we would say that only with a large herd of cows, where hand milkers are unavailable, is it likely to be of much service. We could not recommend it at all unless the flavor of the milk was very much better than it was most of the time during which we used it.

The Air Process of Butter Making.

Butter making, by means of forcing air through the cream, had quite a boom in Toronto during the past summer. The " press " gave the matter considerable space, and, as a consequence, a great many letters came to the department here making enquiries about the new process which " would revolutionize butter making." I went to Toronto to investigate and found that it was a revival of the method reported on by us a few years ago. There was nothing new whatever in the system, and the butter made was of very inferior quality. A member of a Toronto firm paid us a visit and promised to send us a complete outfit to further test it before they invested, but, so far, they have not done so.

Working over Old Butter.

A commission house sent us five tubs of stale butter to work over and see if we could improve the flavor. We tried various methods of handling this butter, but did not succeed in improving it very much. When butter becomes very rancid it is almost impossible to restore it to a condition fit for table use. By melting the butter and churning it in fresh butter milk, the flavor is improved somewhat, but the grain and body of the butter are spoiled.

The lesson from this is plain: make nothing but good butter, and do not hold good butter until it becomes rancid and unfit for table use. A great deal of money is lost each year on bad butter.

Dairy and Institute Meetings.

I have attended and delivered dairy addresses at the following places during the year: St. Marys, (Creameries), Brantford, (Western Dairy Association), Milverton, Listowel, Port Elgin, (special meeting arranged for by Western Association), Burford, Hamilton, (Pure Food Show), Welland, Essex Union Factory, Cottam, Malden, Harrow, Madoc, Barrie, and Hillsburg. In December I shall attend a series of institute meetings as follows: Harwood, Grafton, Wooler, Frankford, Wallbridge, Bloomfield, Demorestville, Plainfield, Shannonville, Napanee, Centreville, Tamworth, Madoc, Stirling, Warkworth, Norwood, Keene, Lakefield, and Peterboro'.

Testing Cows.

Several requests have been made for a representative of the college to make official tests of Holstein cows at the farms of the owners. Last year Mr. Gilroy's herd was tested by a representative of the dairy department. This year Messrs. Gilroy, Rice and Clemons have reqested us to make official tests for them. At the time of writing, only Mr. Gilroy's cows have been tested, while Messrs. Rice have requested a representative to be sent to their farm on November 23rd. The American Holstein Friesian Association are offering liberal cash prizes for the best records of butter made in seven days by Holstein cows. A number of Canadian breeders are entering the competition, and the prospects are that they will win a fair share of the money to be competed for.

Improvements During the Year.

The chief improvements during the year have been the levelling of the dairy yard with coal ashes and gravel; the painting and whitewashing of the inside of the dairy buildings; the purchase of a combined churn and worker for use in the dairy school of 1898; and the placing of the latest improved separators for the classes of 1897 and 1898; and in this connection I would beg leave to thank Messrs. R. A. Lister & Co. Dursley, Eng., for the gift of a No. 1 Alexandra separator, and the Canadian Dairy Supply Co., Montreal, for a No. 2 Baby Alpha de Laval separator.

In addition there is being erected at the present time a large brick chimney for the boilers at the dairy. The old smoke stacks were completely spoiled and threatened to fall and damage the buildings, and perhaps do more injury. The new chimney will be a credit to the department.

All of which is respectfully submitted,

H. H. DEAN,
Professor of Dairying.

Ontario Agricultural College,
Guelph, Ont., November 30, 1897.

PART VII.

REPORT OF THE AGRICULTURIST.

To the President of the Ontario Agricultural College :

SIR,—I have the honor to submit herewith my fifth annual report.

Teaching. As in previous years, teaching has constituted an important part of my work, and my lectures have followed very closely the outline of work in agriculture and live stock, given in the College circular. In addition to lectures in the College, I may mention those delivered at farmers' institute meetings and at the Toronto Normal School.

Experimental Feeding. My work in this department has developed considerably during the past year, and I expect to extend it still further. Increased facilities have been afforded by taking over the dairy piggery, which is being refitted for breeding purposes. A report of the live stock experiments conducted during the past year is given below :

EXPERIMENTS IN CATTLE FEEDING.

DIFFERENT QUALITIES OF MEAL FOR FATTENING STEERS.

During the winter of 1896-97, an experiment was conducted in feeding steers light, medium and heavy meal rations. For this purpose nine steers of only medium quality were purchased on the Toronto market, and divided into three groups, each group comprising three steers. The experiment commenced on December 3rd, and it was intended to feed for June shipment ; but, to suit the convenience of the purchasers, the steers were kept until July 8th, and received their last feed on July 7th. Thus the feeding extended over a period of 216 days, the first three weeks of which constituted a preparatory period, during which all the steers received the same ration.

The plan of experiment was to increase the meal ration of group 1 until it reached one pound per day for every hundred pounds live weight of the animals ; group 2, to two-thirds of a pound of meal for every hundred pounds live weight, and group 3, to one-third of a pound of meal per hundred pounds live weight—that is, group 2 received just two-thirds of the meal ration of group 1, and group 3 received one-third of the meal ration of group 1. The other foods used were the same for all groups.

Some difficulty was experienced in getting group 1 to take the full quantity of meal intended, but by February 19th they had reached ten pounds of meal each per day, when their average weight was 1,079 pounds. By March 19th they had reached eleven pounds of meal per day, and before the end of April they had reached twelve pounds per day, which was as high as we deemed it safe to go. No difficulty was experienced with the other two groups, but it was found that the meal ration of group three was insufficient; so it was increased on April 14th to the same amount as that received by group two, viz., two-thirds of a pound per day per hundred pounds live weight, and this ration was continued until the close of the experiment.

The meal was fed in two feeds, except in the case of the heavy ration steers, whose meal ration was divided into three equal parts. Until April 8th, the steers all received what straw they would eat morning and evening, with ten pounds of hay at noon. After April 8th, they were fed as much hay as they would eat. They were fed turnips at noon, receiving twenty pounds each during part of the time, and twenty-five pounds during the remainder of the time up to May 20th. On May 20th the turnips were finished, and ensilage was substituted, the steers being fed at first fourteen pounds, which was eventually increased to twenty pounds each per day.

The meal ration consisted of equal parts by weight of peas, barley, and oats, and the values attached to the foods used are as follows: Meal $13; hay, $6; straw, $3; ensilage, $2; and roots, $2 per ton.

During the course of the experiment, one steer in group 2 and one in group 3 were found to be entirely unsuitable for the experiment, and consequently they were discarded and the experiment completed with but two steers in each of these two groups.

The results are briefly stated in the following tables:

Table I. Weights and gains.

	Weight when bought.	Weight when sold.	Total gain.	Aver'ge gain per steer.	Aver'ge gain per steer per day.
	lbs.	lbs.	lbs.	lbs.	lbs.
Group I, heavy ration (3 steers) ..	2,700.	3.870.	1,170.	390.	1.80
Group II, medium ration (2 steers).	1,999.	2 765.	766	383	1.77
Group III, light ration (2 steers)....	1, 75.	2,650.	675.	337.5	1 56

Table II. Financial statement.

	Cost price.	Selli'g price.	Difference between cost and selling prices.	Cost of food.	Net profit.	Net profit per steer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Group I, heavy ration (3 steers	78 50	181 95	103 45	74 59	28 86	9 62
Group II, medium ration (2 steers	58 10	130 00	71 90	42 89	20 01	14 50
Group III, light ration (2 steers	57 40	124 60	67 20	39 92	27 28	13 64

From Tables I. and II. it wi l be seen that the heavy ration steers made the greatest gain, but gave the smallest profit, the largest profit being obtained from the medium ration steers.

Before the steers were shipped, the buyers, Messrs. Strachan & White, of Guelph, visited the stable and judged them for fatness.

Table III. shows the order in which they were placed according to degree of fatness, and the group to which each steer belonged.

Order of merit.	Steers.	Group.	Ration.
1st	Steer No. 1	I	Heavy.
2nd	" 6	III	Light.
3rd	" 2	I	Heavy.
4th	" 7	III	Light.
5th	" 4	II	Medium.
6th	" 5	II	Medium.
7th	" 3	I	Heavy.

The classification shown in Table III. is rather surprising, since the two light ration steers are placed above the medium ration steers. This is only one experiment, however, and it will be well to reserve judgment until further tests are made. A similar experiment is in progress this season.

Sweet and Dent Corn for Milch Cows.

This was an experiment undertaken to compare green sweet and dent corn for milch cows. Four cows were obtained from the Dairy department, care being taken to select cows as nearly as possible in the same stage of lactation. Previous to the commencement of the experiment, the cows were on clover pasture, and received about one pound of meal each per day. The meal was composed of about equal parts of bran and oil meal.

During the first ten days of the experiment, the cows were fed green corn alone, cows 1 and 2 receiving sweet corn, and cows 3 and 4 dent corn. At the end of ten days, four pounds of meal were fed to each cow per day, and the meal ration continued throughout the remainder of the experiment, or a period of eleven days. The meal ration consisted of equal parts by weight of barley, shorts and oil meal. The variety of sweet corn used was Evergreen Sweet, and the dent corn was Mammoth Cuban. The corn was grown on the experimental plots, under the supervision of Mr. Zavitz.

The cows did not eat the dent corn so readily as the sweet, and for a time wasted a considerable quantity of it, the waste becoming less as time went on. The waste corn was carefully weighed and recorded. Table I. shows corn fed and eaten.

Table I. Green corn fed, eaten, etc.

Amount of green corn fed.		Amount of green corn eaten.		Amount wasted.		Amount of green corn eaten per 100 lbs. live weight of cows.	
Sweet.	Dent.	Sweet.	Dent.	Sweet.	Dent.	Sweet.	Dent.
lbs. 3,641	lbs. 3,410	lbs. 3,624	lbs. 3,156	lbs. 17	lbs. 254	lbs. 151.63	lbs. 145.10

The total weight of the two cows on sweet corn was 2,390 pounds, and of those on dent corn, 2,175 pounds. For this reason the fourth column has been added, which shows that cows on sweet corn consumed more per hundred pounds live weight than did the others.

Table II. shows the effect of the feeding upon the milk yield, and includes the milk yield during the six days preceding and following the corn feeding.

—	*Period I.* Clover pasture with 1 lb. meal.	*Period II.* Green corn alone.		*Period III.* Green corn with 4 lbs. meal daily.		*Period IV.* Pasture and meal	
	Average daily milk yield during 6 days preceding experiment.	Average daily milk yield during last 6 days that cows received corn alone.	Average daily shrinkage in milk yield during Period II.	Average daily milk yield during last 6 days that cows received green corn and meal.	Average daily increase in milk yield during Period III.	Average daily milk yield during 6 days following close of experiment.	Average daily increase or shrinkage in milk yield during Period IV.
Cow No. 1, sweet corn ...	19 8	16 0	3 8	17.4	1.4	15.6	−1.8
Cow No. 2, sweet corn ...	23.1	14.6	8.5	15.8	1.2	14.6	−1.2
Cow No. 3, dent corn	19.6	14 3	5.3	15.3	1.0	15 8	+0.5
Cow No. 4, dent corn ...	25.6	16.2	9.4	17.5	1 3	18.5	+1.0
Average for sweet corn group	21.4	15.3	6.15	16.6	1.3	15.1	−1.5
Average for dent corn group	22 6	15.25	7.35	16.4	1.15	17.15	+0 75

1. That when fed corn alone, the dent corn group suffered a greater shrinkage in milk yield than the sweet corn group.

2. That when meal was added to the ration, both groups increased in milk yield, but the sweet corn group increased slightly more than the dent corn group.

3. That when returned to pasture, both cows of the sweet corn group decreased in milk yield, while both cows of the dent corn group slightly increased in milk yield.

These three points all seem to indicate that sweet corn is better adapted to maintaining the milk flow than is dent corn. But when Table I. is taken into consideration, it appears that the superiority of the sweet corn in this experiment was due to its greater palatability, since the cows on sweet corn consumed more corn per hundred pounds live weight than those on dent corn.

There is one more important consideration. The sweet corn yielded at the rate of 29,280 pounds of green fodder per acre, while the dent corn yielded at the rate of 36,376 pounds per acre, or a difference of 7,096 pounds of green fodder per acre in favor of the dent corn. This greater yield of dent corn more than compensates for what is lost when compared with sweet corn for milk production, and therefore this experiment would indicate that the dent corn proved more economical than the sweet.

Oats and Peas and Oats and Tares for Milch Cows.

In this experiment a comparison was made of green oats and peas and oats and tares for milch cows. The fodders were grown on the experimental plots by Mr. Zavitz. The seed was mixed in the proportion of two bushels of oats to one of peas, and two bushels of oats to one of tares per acre. Four cows were used in the experiment, two cows being fed on each ration.

The experiment brought out the following points :

1. The oats and peas yielded at the rate of 14,760 pounds of green fodder per acre, and the oats and tares 14,688 pounds per acre.

2 Neither fodder could be said to excel the other as a milk producer.

3. Both fodders were eaten readily by the cows, no difference being noticeable in this respect.

4. The oats and peas had a slight advantage in yield per acre.

Green Rye and Alfala for Milch Cows.

This was a short experiment for the purpose of comparing the early soiling crops, rye and alfalfa. The fodders were grown on the experimental plots. Four cows were used, two receiving rye and the other two alfalfa.

The following points in connection with the experiment are of interest :

1. The rye, which was a medium crop, yielded at the rate of 12,375 of green fodder per acre, and the alfalfa yielded a first cutting at the rate of 15,300 pounds of green fodder per acre.

2. The alfalfa was eaten rather more readily by the cows than the rye.

3. The milk yielded was slightly in favor of the alfalfa.

4. When scored by an expert, the rye butter scored thirty-five points of flavor, and the alfalfa butter forty points for flavor, out of a possible score of forty-five points.

5. The plot of alfalfa furnished two subsequent crops, which made the total yield from the alfalfa plot more than double that stated above, whereas the rye made but an indifferent second growth.

6. In this experiment, therefore, alfalfa proved very much superior to rye as a soiling crop.

EXPERIMENTS IN PIG FEEDING.

Comparison of Sweet and Sour Whey.

During the summer of 1896, two experiments were conducted for the purpose of comparing the feeding value of sweet and sour whey for fattening hogs. During the past summer the work was continued and three additional experiments completed. In each experiment nine hogs were used, making three groups, with three hogs in each group. During the preparatory period all groups received sweet whey and meal, commencing with a small quantity of whey and gradually increasing. Exactly the same amount of whey and meal was fed to each group during this period. At the end of the preparatory period the whey was omitted from the ration of one group and water substituted. In another group, sour whey was fed instead of sweet whey, while the third group continued to receive sweet whey. In each experiment the two whey groups were fed the same quantities of meal and whey, and were given all they would eat readily. A full feed of whey consisted of two pounds of whey to one of meal. The groups receiving water and meal also was given as much food as the animals would eat readily ; but the hogs in this group naturally consumed more meal than those receiving whey. The meal ration for all groups consisted of equal parts by weight of peas, barley and shorts. The sour whey was kept in a whey tank which had not been cleaned since early in the summer of 1896.

The results of Experiment No. 3 are summarized in the following tables :

Table I. Weights and gains (live weight) of hogs used.

	Preparatory period, 7 days.				Experiment proper, 29 days.		
	Weight at beginning.	Weight at close.	Total gain.	Average gain per hog per day.	Weight at close.	Total gain.	Average gain per hog per day.
Group I. (sweet whey)	374	400	26	1.24	521	121	1.38
Group II. (sour whey).....	377	404	27	1.29	514	110	1.26
Group III. (water).....	377	409	32	1.52	527	118	1.35

Table II. Food consumed during experiment proper (29 days.)

	Total food consumed.		Food consumed per 1 lb. gain, live weight.	
	Meal.	Whey.	Meal.	Whey.
Group I. (sweet whey)	407.5	747.	3.36	6.17
Group II. (sour whey)	407.5	747.	3.70	6.79
Group III. (water)	506.	.....	4.28	

In experiment No. 4, the hogs in the sweet whey group became crippled just as they reached the full feed of whey, and, though they recovered within a short time, still they received such a serious check that it was deemed advisable to leave them out of the comparison, and make the experiment merely a comparison of sour whey and meal with water and meal. It is rather strange, however, that the sour whey group suffered no injury, though receiving the same amount of whey.

Table III. Weights and gains (live weight of hogs used.

	Preparatory period, 14 days.				Experiment proper, 64 days		
	Weight at beginning.	Weight at close.	Total gain.	Average gain per hog per day.	Weight at close.	Total gain.	Average gain per hog per day.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Group I. (sour whey).....	230	283	53	1 26	515	262	1.36
Group II. (water).....	227	282	55	1.31	554	272	1.41

Table IV. Food consumed during experiment proper (64 days.)

	Total food consumed.		Food consumed per lb. gain, live weight.	
	Meal.	Whey.	Meal.	Whey.
	lbs.	lbs.	lbs.	lbs.
Group I. (sour whey)	914	1,825	3.48	6.96
Group II. (water)	1,138 5	....	4.18	

WHEY EXPERIMENT No. 5.

Table V. Weights and gains (live weight) of hogs used.

	Preparatory period, 10 days.				Experiment proper, 31 days.		
	Weight at beginning.	Weight at close.	Total gains.	Average gain per hog per day.	Weight at close.	Total gain.	Average gain per hog per day.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Group I. (sweet whey)	290	343	53	1.76	517	174	1.87
Group II. (sour whey)	295	340	45	1.50	523	183	1.96
Group III. (water).....	289	340	51	1.70	533	193	2.07

Table VI. Food consumed during experiment proper (31 days)

	Total food consumed.		Food consumed per lb. grain, live weight.	
	Meal.	Whey.	Meal.	Whey.
	lbs.	lbs	lbs.	lbs.
Group I (sweet whey)	617.	1,060	3.54	6.09
Group II. (sour whey)	617.	1,060	3.37	5.79
Group III. (water).....	754.5	.....	3.91	.....

Experiment No. 5 is remarkable for the rapid gains made by the hogs in the " water group," thus making the food required for one pound of gain less than that required by the water groups in any preceding experiment. The hogs of this experiment were shipped to the Wm. Davies Co., Toronto, along with the hogs of the breed experiment, in order to ascertain whether the whey had any injurious effect upon the quality of the meat, and the report of Mr. J. W. Flavelle, managing director of the company, is given below. Group A received sweet whey, Group B sour whey, and Group C, water. The numbers refer to the ear labels.

Mr. Flavelle's Report.

Group A. 59, 60 and 61 ; fat firm ; 59 too fat.

Group B. 56, 57 and 58 ; fat firm ; all three hogs quite too fat.

Group C. Number 1, 54 and 55 ; fat firm.

We can see no difference in the firmness of these three lots of hogs. They are all alike good.

It will be seen from this report that no bad effects followed the use of the whey, though the sour whey group seems to have produced fat more rapidly than the others. The hogs were kept somewhat longer than they should have been, in order to complete the experiment ; hence the excessive fat.

Table VII. Summary of Five Experiments.

	Amount of meal saved by 100 lbs. sweet whey.	Amount of meal saved by 100 lbs. sour whey.
	lbs.	lbs.
Experiment No. 1 (1896)	13.32	13 61
" 2 (1896)	13.32	13.81
" 3 (1897)	14.88	7.87
" 4 (1897)	No test.	10.07
" 5 (1897)	6.08	9 34
Average	11.90	10.94

Thus it will be seen that in experiment No. 3, the sweet whey gave much better results than the sour; but in the other experiments the sour whey had the advantage. Experiment No. 3. therefore, is a marked exception to the rule, and it is this experiment which makes the difference in the average in favor of the sweet whey. In making up the average for the sour whey, five experiments were included, whereas there are only four for the sweet whey. Leaving out experiment No. 4 in both cases. the average number of pounds of meal saved by 100 pounds of sour whey would be 11.15 instead of 10.94.

In order, if possible, to throw more light on the question, six chemical analyses of the sweet and sour whey were made at different times by Mr. Harcourt.

Table VIII. Analyses of Sweet and Sour Whey.

	Sweet whey.		Sour whey.	
	Nitrogenous matter.	Sugar.	Nitrogenous matter.	Sugar.
	per cent.	per cent.	per cent.	per cent.
Analysis No. 1	.846	5.015	.974	None
" 2	.838	4 940	.940	.....
" 3	.866	4.950	.952	.....
" 4	.806	5 005	1.019	.44
" 5	1.062	3 870	.944	.05
" 6	1.106	4.475	1.009	None.
Average of six analyses	.920	4.709	.973	.081

From the analyses it would appear that the fermentation of the sour whey took place entirely at the expense of the sugar, of which only a trace remained, while the nitrogenous matter of the sour whey was somewhat higher than that of the sweet. It is difficult to account for the higher percentage of nitrogenous matter in the sour whey, unless the sour whey had become somewhat concentrated from evaporation.

A general review of the work performed up to date, taking into consideration the health of the animals, their gains, the quality of their flesh, and the composition of the sweet and sour whey, seems to point towards the conclusion that fermentation does not seriously detract from the value of whey for pig feeding.

Comparison of Different Breeds of Swine.

This experiment is a continuation of the work commenced last year, and in the spring thirty-six pigs were purchased, comprising six animals of each of the following

breeds: Improved Yorkshire, Chester-White, Duroc-Jersey, Tamworth, Poland-China and Berkshire. Accurate account was kept of the food consumed and the gains made by representatives of the different breeds, between the ages of 90 and 180 days, the results of which are given in the following table:

Table showing gains, food consumed, etc., between ages of 90 and 180 days:

Breed.	Average weight at 90 days.	Average weight at 180 days.	Total gain per hog in 90 days.	Average gain per hog per day during 90 days.	Average meal consumed per hog in 90 days.	Average meal consumed per 100 lbs gain live weight.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Berkshire	53.00	145.00	92.00	1.02	301.	327.17
Tamworth	52.00	139 33	87.33	.97	289.	330 92
Poland-China	52.33	128.33	76.00	.84	253.	332 89
Chester-White	51.66	126.66	75.00	.83	255.	340 00
Yorkshire	60.33	144.00	83.67	.93	285.	340.62
Duroc-Jersey	64.66	149.00	84.34	.94	302.	358 05

In the above table, the breeds are arranged in order of economy of gain, but it will not do to draw conclusions as yet, since individuality plays a very important part in such an experiment.

With a view to obtaining information relative to the suitability of the different breeds for export trade, the hogs of this experiment were shipped to the Wm. Davis, Co. Ltd., Toronto. On reaching the yards, the foreman, who grades all the hogs brought to the factory, was asked to select from each breed the three hogs which he regarded as best suited to make export bacon This he did, and these eighteen animals were slaughtered separately. Mr. J. W. Flavelle, managing director of the firm, inspected the carcases and furnished the notes which appear below. Mr. Flavelle was not given the names of the breeds, but simply the groups and the ear labels of the hogs in each group. Following is the arrangement of the groups:

Group 1, Yorkshire.....Average weight at time of killing .....153 33 lbs.
" 2, Chester-White.. " " " .....155 00 "
" 3, Duroc-Jersey .. " " " .....186 66 "
" 4, Tamworth ..... " " " .....163 33 "
" 5, Poland-China... " " " .....158 33 "
" 6, Berkshire..... " " " .....156 66 "

Report of Mr. J. W. Flavelle, Managing Director of the Wm. Davies, Co., Toronto:

"Covering the hogs which you delivered to our house the past week, please note the following:

"*Group 1.* Hogs 11 and 12: lean; fat even down the back; thick bellies; shoulders sizeable; for their size, lengthy between shoulder and ham; generally desirable; very desirable if they had been a little larger. This, we suppose, could have been secured by giving the hogs a longer time to grow. Number 10 of this group is quite too fat on the back for best side, yet the general characteristics of the other two are noticeable here, also that the fat is even on the back; this is a good pig spoiled by too rapid feeding and too much of it. The fat in 12 feels tender; it is more noticeable in it than in 11, while 10 is the firmest of the three.

"*Group 2.* 16, 17 and 18: general character, short and thick; an absence of flesh; bone sizeable; generally undesirable for export sides. Number 16 particularly fat; very little flesh and somewhat tender.

"*Group 3.* 23, 24 and 25: general character, coarse shoulders and large heads. Number 23 fat. Numbers 24 and 25 will make Number One Sides, but not desirable owing to coarse shoulders and shortness of side between ham and shoulder. Number 24 and 25, a little tender in the fat.

"*Group 4.* 27, 28 and 30: general character, lean lengthy and full of flesh; good belly and desirable for best sides, except that head is a little large, and the gammon (ham) looks as if it were poorly developed, but this we will determine when the hogs are cut up; fat, very even down the back.

"*Group 5.* 33, 37 and 38: Irregular in size; coarse; short between ham and shoulder, particularly 38; head, large and coarse; shoulder thick and undesirable; fat even on the back. 33 quite tender and off color. 37 and 38 tender, but not so bad as 33; undesirable for export trade.

"*Group 6.* 39, 42 and 44: generally short and thick; shoulders of 39 and 42 thick and too heavy; these two hogs quite too fat with very little flesh. 44 very short, but fairly lean and even down back. Not a desirable class for export bacon."

Additional notes on groups 1 and 4, by Mr. Flavelle.

"We have this morning carefully inspected the sides from groups 1 and 4. These two groups we considered quite the best of the lot when they were hanging, and were inclined to think group 4 the better of the two. We find, however, after inspecting the sides, that group 4 pinches in the loin, and the gammon is meanly developed—a great long shank with an insufficient supply of meat to balance it up. In group 1 the side is singularly even and level throughout; the loin full, and an absence of the pinched appearance of loin in group 4; the gammon is well developed, and therefore the sides from group 1 are distinctly better than from group 4."

Mr. Flavelle's report requires little explanation. The tenderness of fat must not be regarded as due to pecularities of the breeds, nor yet was it due to the food, since the hogs received the same meal ration as the hogs of the whey experiment previously noted, all of which were firm. It was more likely due to the fact that the hogs were too closely confined, and were possibly kept in rather too high condition. It would be well, therefore, not to take the "tenderness" into consideration in reading the report.

It is the intention to carry this work further, not with the view of showing that any one breed excels all others in every respect, as no doubt such a breed does not exist, but for the purpose of studying the characteristics of the different breeds so far as such experiments permit. The aim is not to injure any breed, but to further the interests of all by setting breeders on their guard against any weaknesses which may be found to exist. Moreover, the careful study of the different breeds will form a basis for intelligent cross-breeding, which work will be undertaken as soon as circumstances permit. Once more I must appeal to all who may read this report not to form hasty or one sided conclusions, for the difficulties in the way of such work are numerous and great, and progress is necessarily slow.

Acknowledgment.

The experimental feeding department is indebted to the farm, dairy, experimental, chemical, and horticultural departments, for valuable assistance and co-operation, all of which is gratefully acknowledged.

Respectfully submitted,

G. E. DAY,
Agriculturist.

Ontario Agricultural College,
November 30th, 1897.

PART VIII.

REPORT OF THE HORTICULTURIST.

To the President of the Ontario Agricultural College :

SIR,—I have the honor of presenting herewith the annual report of the Horticultural Department, for the year 1897. The extent and varied character of the work in this department presents many interesting and important fields for investigation. The limited attention which must necessarily be paid to some of these often causes us to regret that more cannot be accomplished. It gives me pleasure, however, to state that, in many branches of the work considerable progress has been made during the past year, as may be seen by a perusal of our report.

LECTURES. One of the first and most important duties in conection with our work is the instruction of students in attendance at the college. We have endeavored to make all students under our charge as proficient as possible in both the theory and practice of the subjects taught. A full course of lectures on the different branches of horticulture, as outlined in the college circular, has been given to second and third year students. This course covers pretty fully the subjects of Fruit Growing and Vegetable Gardening, and, as fully as is thought to be usefnl for our students, the subjects of Landscape Gardening, Aboriculture and Floriculture.

On account of the long illness of our esteemed friend, Prof. Panton, I have endeavored to the best of my ability, to take up his work of teaching entomology. Three lectures a week on this subject have been given to the students of the second year during the fall term.

PRACTICAL WORK. The studies covered in lectures have been supplemented as much as possible by practical work in the afternoons in the various branches of the department. This work has been done under my personal supervision, and is found to be the most satisfactory way of impressing lessons taught in the class. Along this line students have had practice in planting and pruning fruit trees and berry bushes; pruning and training grape vines; preparing and applying spraying mixtures; practising different methods of grafting on herbaceous and hard wooded plants; originating new varieties by hand pollination; germinating and testing seeds; transplanting seedlings; forcing vegetable crops; potting and handling house plants; studying and identifying forest trees, etc.

The regular work of this department, apart from that of teaching, inspecting Fruit Experiment Stations, directing co-operative fruit tests, lecturing at Farmers' Institutes, and attending to a large correspondence, is of a varied character and requires a great deal of time and thought. It includes the care and management of: 1. The orchards; 2. Small-fruit plantations; 3. Vegetable garden; 4. Lawn and grounds; 5. Forestry plantations; 6. Conservatories and greenhouses. The work undertaken in these branches during the past year will be briefly noted in the order mentioned.

The Orchards.

The greatest need of this department for years past has been an orchard of the different kinds of fruit trees, not only for the purpose of supplying the requirements of the College, but to afford an opportunity for practical instruction to students in the care and management of such trees. What trees we have had are insufficient for this purpose, and are so scattered about the place that they can hardly be said to constitute an orchard.

To meet this long-felt want, an orchard of 600 trees was set out early in the spring This orchard is made up of 280 apple trees, 120 pear trees, 120 plum trees and 80 cherry trees. As a preparation for planting, the land was thoroughly underdrained a year ago. Last summer it was plowed out of a clover sod, then deeply cultivated and worked until the sod was made fine, and ridged up in the fall according to Mr. Rennie's method of preparing land for corn. In the spring the ridges were worked down, the land put in fine tilth, and the trees planted as early as possible. Corn was afterwards sown in drills between the rows of trees, care being taken that it did not encroach upon the trees. For several reasons we consider this one of the best crops to grow in a newly planted orchard. It permits of thorough cultivation and gives a partial shade to the trees, much like what they have had in the nursery row, and protects them from sweeping winds until they become established.

With the especially favorable season for planting which we have had, very few of the trees have failed to grow. The principal failures being among the sweet cherries, which, although they leafed out nicely, seemed very slow to take root after transplanting. All such vacancies will be filled in the spring.

That this orchard might be not only a means of instruction for students, but one of interest to intending planters, it has been made up of a large number of varieties, of which we wish to determine the value for this section of the country. In this way it will be of the same public value to this inland part of the country that the various fruit experiment stations are to the districts in which they are located. Three trees of each variety were planted, and additional blocks set for grafting and experimental purposes of Talman Sweet apples, Flemish Beauty pears, Glass Seedling plums, and Early Richmond cherries. The following is a list of the varieties planted :

Apples.

Alexander	Fall Sweet	Maiden's Blush
Babbit	Fameuse	Mann
Baldwin	Fanny	Milding
Belle de Boskoop	Gano	McIntosh Red
Ben Davis	Gideon	McMahon's White
Benoni	Golden Russet	Northern Spy
Bethel	Golden Sweet	Northwest Greening
Blenheim Pippin	Gravenstein	Ontario
Bottle Greening	Grime's Golden	Peck's Pleasant
Canada Baldwin	Haas	Peter
Canada Red	Hare Pipka	Pewaukee
Colvert	Hastings	Princess Louise
Cooper's Market	Hubbardston Nonsuch	Pumpkin Sweet
Cranberry Pippin	Hurlbut	Red Astrachan
Delaware Red	Jonathan	Red Bietigheimer
Duchess of Oldenburg	King	Ribston Pippin
Early Harvest	Lady	Rhode Island Greening
Fallawater	La Rue	Rolfe
Fall Jenetting	Longfield	Roxbury Russet
Fall Pippin	Magog Red Streak	Salome

APPLES.—*Continued.*

Scott's Winter
Shackleford
Shiawassee Beauty
Stark
Stump
St. Lawrence
Sutton Beauty
Talman Sweet
Tetofsky
Trenton
Utter's Red
Wagener
Wallbridge
Wealthy
Westfield Seek-No-Further
Wellington
Winter St. Lawrence
Wolf River
Yellow Transparent

Crab Apples.

General Grant
Hyslop
Martha
Montreal Beauty
Transcendent
Whitney

PEARS.

Bartlett
Bartlett Seckel
Belle Lucrative
Bessemianka
Beurre Bosc
Beurre Clairgeau
Beurre d'Anjou
Beurre Diel
Beurre Giffard
Beurre Hardy
Clapp's Favorite
Dempsey
Doyenne Bussock
Doyenne d'Ete
Duchesse d'Angouleme
Easter Beurre
Flemish Beauty
Goodale
Howell
Idaho
Josephine de Malines
Kieffer
Lawrence
Lawson
Lincoln
Louise Bonne
Manning's Elizabeth
Petite Marguerite
President Druard
Ritson
Seckel
Sheldon
Tyson
Vermont Beauty

PLUMS.

Abundance
Beauty of Naples
Bradshaw
Burbank
Coe's Golden Drop
De Soto
Diamond
Duane's Purple
Field
French Damson
General Hand
German Prune
Gueii
Glass Seedling
Grand Duke
Hawkeye
Imperial Gage
Lombard
McLaughlin
Monarch
Monroe
Montreal
Moore's Arctic
Niagara
Pond's Seedling
Prince Englebert
Purple Egg
Quackenbos
Reine Claude
Saunders
Shippers' Pride
Shropshire Damson
Smith's Orleans
Stanton
Victoria
Washington
Weaver
Wolf
Yellow Egg

CHERRIES.

Belle Magnifique
Black Eagle
Black Heart
Black Tartarian
Coe's Transparent
Downer's Late
Dyehouse
Early Purple
Early Richmond
Elton
Empress Eugenie
Governor Wood
Knight's Early
Late Duke
May Duke
Montmorency
Napoleon Bigarreau
Olivet
Reine Hortense
Schmidt's Bigarreau
Vladimer
Windsor
Wragg
Yellow Spanish

SMALL FRUIT PLANTATION.

In the new plantation of small fruits set out in the spring of 1896 there were quite a number of failures owing to the extremely dry weather for a month or six weeks after the plants were set out, the chief failures being among the raspberries and gooseberries.

Of the currants and blackberries very few plants died. Early in the spring all of the spaces were filled, and with the favorable season the plants have made a good growth.

On most varieties there was a very fair crop of fruit, considering that the bushes have been but one year planted. Where possible six good representative bushes of each variety were selected and the crop carefully weighed. The yields given below are the average per bush; and although this is but the beginning of our tests, and these results cannot be taken as conclusive, yet they are indicative of the productiveness of the different varieties.

RASPBERRIES.

Rank.	Varieties.	First picking.	Last picking.	Yield per bush. (ounces).
	Black.			
1	Palmer	July 16	July 30	11.90
2	Souhegan	" 16	" 28	10.12
3	Older	" 16	" 30	9.75
4	Carpenter's Early	" 16	" 28	8.79
5	Ohio	" 19	" 30	6.92
6	Eureka	" 16	" 23	4.62
7	Mammoth Cluster	" 16	" 30	3.75
8	Kansas	" 19	" 26	3.37
9	Conrath	" 19	" 26	2.12
10	Hilborn	" 19	" 23	1.75
11	Gregg	" 23	" 30	1.75
12	Johnston's Sweet	" 26	" 26	.50
	Red.			
1	Shaffer's Colossal	July 21	Aug. 21	22.87
2	Louden	" 19	" 21	14.45
3	Cuthbert	" 26	" 21	11.81
4	Marlborough	" 16	" 14	10.29
5	Royal Church	" 26	" 21	8.92
6	Turner	" 16	" 21	8.21
7	Highland Hardy	" 16	" 4	3.50
8	Reliance	" 16	" 4	2.50
9	Rancocas	" 19	July 28	1.42
10	Clarke	" 28	Aug. 9	1.42
11	Brandywine	" 26	" 2	1.04
12	Hansell	" 16	July 28	1.00
13	Thompson's Early	" 16	" 28	.83

CURRANTS

Rank.	Varieties.	Yield per bush. (ounces).
	Red.	
1	Raby Castle	9.66
2	North Star	6.71
3	Victoria	6.46
4	La Versailles	3.21
5	Fay's Prolific	2.83
6	Prince Albert	1.00
7	Belle de St. Giles	.06
8	Cherry	.06
	White.	
1	White Grape	7.83
2	White Imperial	3.16
	Black.	
1	Black Naples	7.12
2	Black Champion	6.71
3	Lee's Prolific	6.54

GOOSEBERRIES.

Rank.	Varieties.	Yield per bush. (ounces).	Weight of 50 average berries.
1	Pearl	30.83	6.00
2	Houghton	22.96	4.25
3	Downing	17.08	4.75
4	Champion	11.04	3.75
5	Red Jacket	10.83	7.25
6	Crown Bob	6.79	6.50
7	Keepsake	6.25	11.50
8	Smith's Improved	5.62	6.50
9	Autocrat	1.12	5.00
10	Whitesmith		
11	Triumph		
12	Industry		

TEST OF VARIETIES OF STRAWBERRIES.

For the past two years we have been testing varieties of strawberries. In last year's report the results are given of a trial 121 of these. This year we had 150 varieties in fruiting, and have added eighty to our collection to fruit next year. The results with many of these during the past two years have shown them to be of little or no value, and if next season's yields confirm these results such varieties will be placed on our discarded list. On the other hand, a number have made excellent records for both seasons, and if, after repeated trials, these records are maintained, such varieties may with confidence be recommended to intending planters.

The treatment given in these experiments may be briefly outlined as follows: The ground on which the strawberries were planted was cropped the previous season with onions, beets, and carrots, during which time it was kept as free as possible of weeds. It was plowed in the fall after the removal of these crops, and top-dressed during the winter with short, barnyard manure. As soon as the land was fit to work in the spring it was plowed again, and put in as fine condition as possible with the harrow and roller. The rows were then marked out four feet apart, and cross marked with a fifteen-inch hand-marker. Twelve plants of each variety were planted, each variety thus being given fifteen feet of a row. A space of thirty inches was left between the different varieties in the same row, to avoid any mixing of runners.

Those of the plants that were of our own growing were taken from the plantation set out the year before, which had not yet borne fruit. Such plants are much more vigorous and thrifty than plants taken from an old plantation which has fruited for one or more seasons.

The planting was done by means or a spade, which was thrust deeply into the ground and then pressed backwards and forwards. Into the cleft thus made the roots were spread out fan-shaped by a quick slapping motion, and the soil packed firmly about them by the feet of the planters. As soon as possible after planting the surface soil was loosened with the horse cultivator and hand hoes, and thorough cultivation was given through the season.

All blossoms were picked off the first season, so that the plants were not allowed to exhaust themselves in the production of fruit. All runners were allowed to set, forming wide matted rows, but each variety was confined to its own fifteen feet of row.

After the ground had frozen hard in the fall it was lightly covered with long strawy manure, which helped to hold the snow, and protected the plants from injury early in the spring by preventing their alternate freezing and thawing. When growth had commenced in the spring, this covering was raked off the plants and left as a mulch between

the rows. This not being heavy enough to keep down the weeds and properly conserve the soil moisture, an additional heavy mulch of coarse grass was put on before the fruit began to ripen. This kept the berries clean and retained the soil moisture while the crop was ripening.

Owing to the cold spring the plants came into bloom about two weeks later this year than last; yet, notwithstanding the lateness of the bloom, many of the first blossoms were blackened by the repeated late spring frosts. But this did not so seriously affect the crop as the extremely hot, dry weather about the middle of the fruiting season in July. The showers following, however, prolonged the fruiting on those varieties which were hardly enough to withstand the effects of the preceding drought.

In the following tabular statement the varieties under test are ranked in the order of their yield. In some cases all of the plants set did not live; where only one or two failed, this would not materially alter their yields, particularly in the case of the free running varieties, as their runners filled the fifteen feet of row alloted to them. The greatest number of failures were among the newly added varieties which came from a distance. Many of these will, no doubt, make a better record next year, when their yield will be from plants of our own growing. The number of plants which lived is mentioned for each variety, so that allowance may be made for some good varieties, which, on account of the failure of some of the plants, stand low on the list.

Rank.	Rank in 1896.	Varieties.	Sex { B. bi-sexual. P. pistillate.	Number of plants lived.	Vigor of growth—scale 1-10.	Freedom from rust—scale 1-10.	Date of first bloom.	Date of first picking.	Date of last picking.	Yield.	Firmness.	Color.	Weight of 50 average berries.
									July	ounces.			ounces.
1	33	Tennessee Prolific	B	12	10	9	May 21..	June 26..	17	281.00	F	C	13.00
2	13	Stone's Early	P	12	10	10	" 21.	July 1..	14	263.75	M	S	6.25
3	8	Saunders	B	12	10	6	June 2..	" 1..	20	261.00	F	D C	11.25
4	17	No Name	B	12	10	7	May 24..	June 28..	20	245.75	F	C	13 75
5	52	Woolverton	B	12	9	9	" 25..	July 1..	20	240 00	M	C	16.00
6	45	Shuster's Gem	P	12	9	5	" 18 .	June 26..	20	234 00	F	D C	10.75
7	....	Wm. Belt	B	12	10	7	" 24..	" 28..	20	232.25	F	D R	13.25
8	10	Haverland	P	12	10	9	" 18..	" 23 .	20	232.00	M	L S	12.00
9	....	Ruby	B	11	10	7	" 21..	" 26..	22	229.75	F	D C	14.25
10	40	Isabella	B	12	10	5	" 23..	" 23.	17	228.25	V F	D C	11.25
11	..	Dominion	B	10	10	4	" 21..	July 3..	22	217.75	S	L S	12.00
12	47	Van Deman	B	12	8	6	" 18..	June 23..	17	214.50	F	D C	10.00
13		Tubbs	B	9	9	7	" 18..	" 23..	20	210 00	F	D R	12 25
14		Liddle	B	9	10	9	" 25..	July 1..	20	209.75	M	L	7.50
15	26	Jocunda Improved	B	12	9	7	" 28..	June 28..	17	205.00	V F	D C	10.75
16	1	Warfield	P	12	10	7	" 24..	" 26 .	20	202 50	V F	D C	9.50
17	62	Aroma	B	12	8	10	" 27..	July 3..	20	193.25	F	D R	10.75
18	7	Barton's Eclipse	P	11	9	5	" 18..	June 26..	20	193.00	F	B C	11.50
19	35	Prince of Berries	B	12	9	5	" 23.	July 3 .	22	192.50	M	B S	11 75
20	....	Enormous	P	12	10	8	" 25..	June 26..	20	191.75	F	C	13.75
21	37	Northern	B	12	10	5	" 21..	July 1..	20	188.75	F	C	7.50
22	79	Judsonia	B	12	9	5	" 24..	June 26..	14	181.25	F	L S	19.75
23	....	Beebe	B	12	7	5	" 21.	July 1..	20	180 25	S	D R	10 50
24	87	Ona	P	12	10	9	" 18..	June 26..	20	177.75	M	S	9.00
25	58	Princeton Chief	P	12	8	6	" 24..	July 3 .	22	173 00	F	C	7.75
26	15	Seedling A	P	11	9	5	" 21..	June 28..	20	173.00	S	L C	7.75
27	38	Enhance	B	12	10	7	" 18..	July 3..	20	171.00	V F	D R	7.75
28	65	Muskingum	B	12	8	8	" 25..	" 3	20	169.75	S	L C	12 00
29	16	Lovett	B	12	10	6	" 18..	June 23..	17	167.75	F	L S	9.75
30	....	Arrow	P	12	10	9	" 21..	" 26..	14	166.50	M	D C	8.00
31	42	Howard's 41	P	12	9	9	" 25..	July 3..	20	162 50	V F	S	7.75
32	39	Leader	B	12	10	4	" 17..	June 28..	20	162.00	M	D C	8.50
33	5	Prize	P	12	10	6	" 18..	" 26..	20	161.75	M	S	7.75
34	....	Phipen	B	5	9	8	" 24..	" 28..	20	161 50	F	B C	10 25
35	54	Ohio Centenial	B	11	8	9	" 21..	July 3..	22	161.50	M	L S	11.25
36	22	Belle(Crawford's 51)	B	12	10	8	" 23..	" 3..	22	158 50	F	B S	9.25

Varieties of Strawberries under test.—*Continued.*

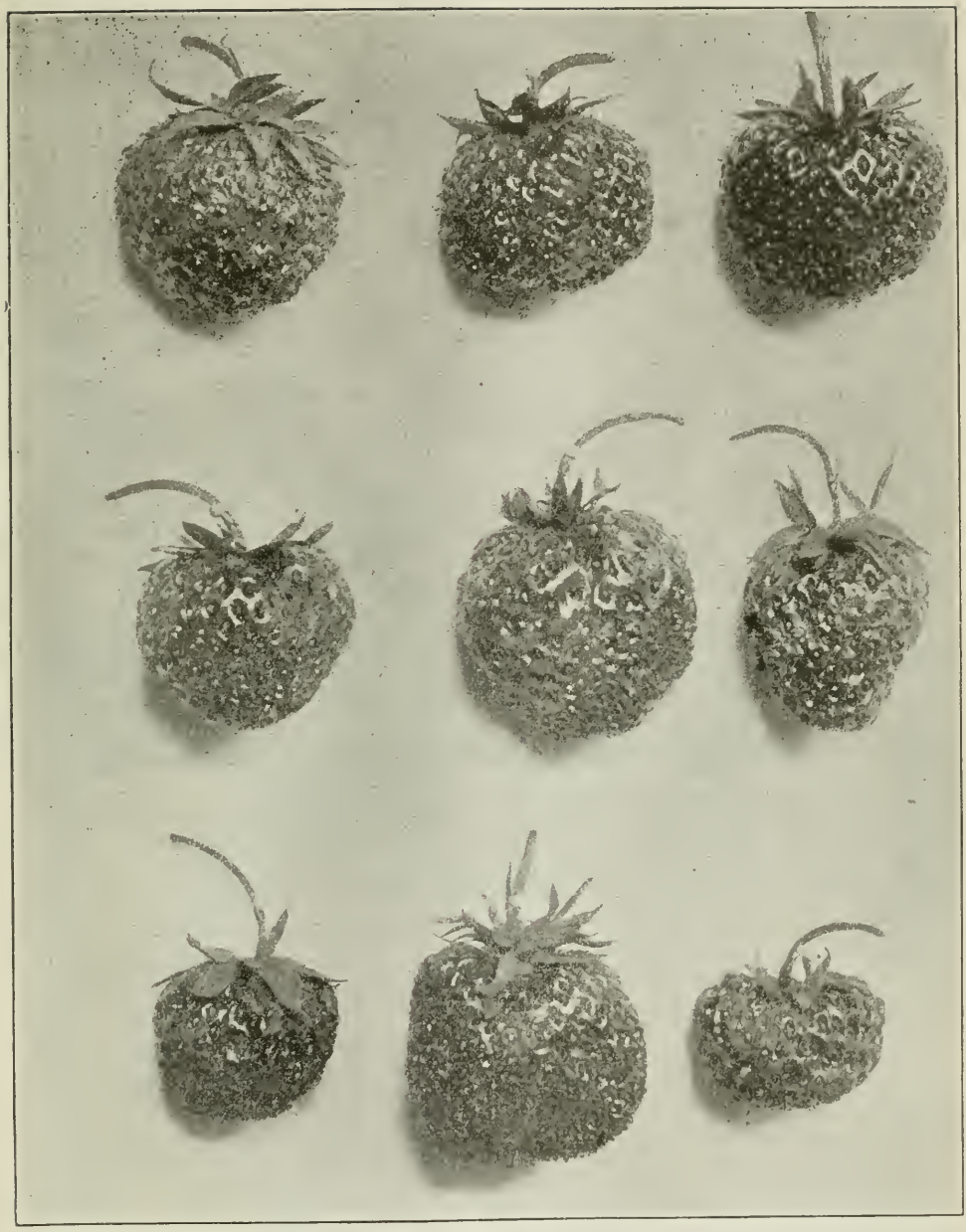
Rank.	Rank in 1896.	Varieties.	Sex { B. Bisexual. P. Pistillate.	Number of plants lived.	Vigor of growth. Scale 1-10.	Freedom from rust—scale 1—10.	Date of first bloom.	Date of first picking.	Date of last picking.	Yield.	Firmness.	Color.	Weight of 50 average berries.
									July.	ounces.			ounces.
37	....	Gandy Belle	B	10	8	3	May 18..	June 26..	12	158.25	M	D C	13.50
38	....	Hunt's No. 3	B	12	9	9	" 18..	" 26..	17	156 50	F	C	12.50
39	...	Thompson's No. 40.	P	11	10	9	" 25..	July 1..	20	156.00	F	L S	8.75
40	....	Cruese's No. 9	B	12	8	8	" 18..	June 26.	17	155.00	F	D C	11 75
41	51	Bessie	B	12	7	6	" 24..	" 23..	14	154.75	F	L S	7.50
42	3	Edgar Queen	P	10	10	5	" 25..	July 1..	22	154 50	S	L R	10.75
43	36	Southard	B	12	8	9	" 18..	June 26..	14	152.50	S	C	9.25
44	34	Splendid	B	12	10	7	" 21..	July 1..	20	152 25	F	D R	10.75
45	72	Hatch Expt Sta. 24	B	12	10	6	" 29..	" 3..	22	151 50	M	D C	12.50
46	31	Williams	B	12	10	6	June 2..	" 1..	22	151.25	F	D C	12.50
47	53	Snowball	B	10	8	6	May 24..	June 28..	20	151.00	F	D R	6 00
48	55	Dayton	B	12	10	6	" 24	" 26..	12	150.50	S	L S	13.00
49	44	Charlie	P	12	9	7	" 25..	" 28..	20	149.50	F	S	6.25
50	14	Boynton	P	12	10	4	" 15..	" 23 .	14	148.50	M	S	6 75
51	20	Oberholtzer No. 1	B	11	9	9	" 14..	" 26..	20	148.25	M	S	11.25
52	....	Giant	B	9	7	7	" 27..	July 1..	20	146.00	F	L R	17.00
53	4	Bisel	P	10	10	7	" 24..	June 28..	20	145 00	F	D C	9.50
54	27	Phillips	B	12	10	6	" 25..	July 3..	17	144.00	F	D C	10.50
55	....	Longfield	P	6	9	6	" 18..	June 26..	20	142.50	V F	D C	7.25
56	32	Dr. Arp	P	12	8	4	" 25 .	July 3..	22	141.25	F	D R	7.25
57	6	Standard	P	11	10	7	" 24..	" 3..	20	139.25	F	S	6 50
58	68	Caughell's No. 2	P	12	10	8	" 25..	" 3..	20	138.00	S	C	12.00
59	43	Rio	B	12	9	8	" 17..	June 23..	12	134.75	F	S	9.25
60	....	Brandywine	B	7	8	7	" 18 .	" 26..	20	133.75	V F	D R	13 75
61	46	Effie May	B	12	8	6	" 14 .	" 28..	14	133.00	M	L R	12.25
62	86	Beder Wood	B	9	7	5	" 17..	" 23..	12	132 75	F	B S	9 75
63	48	Michel's Early	B	12	10	6	" 14..	" 23	12	131 00	S	L R	6.00
64	21	Eureka	P	10	9	7	" 21..	" 26..	17	130.75	S	L S	13 00
65	49	Cyclone	B	11	10	9	" 18..	" 26..	14	127.75	M	S	8 00
66	70	Nehring's Gem	P	12	9	7	" 27..	July 1 .	20	127.00	V F	D R	9.50
67	....	Kansas prolific	B	12	10	4	" 18..	June 28..	20	126.50	F	L S	5.00
68	69	Alabama	B	12	10	6	" 25..	July 1..	20	126.25	V F	D C	10.25
69	19	Gandy	B	11	7	5	" 18..	June 26..	20	125.25	S	B S	11.00
70	30	Robinson	B	12	10	6	" 25 .	July 1..	20	126.25	S	D R	7.25
71	....	Epping	P	12	9	6	" 25 .	June 28..	20	126 00	S	L R	12 00
72	78	Ivanhoe	B	12	8	7	" 24..	" 26..	20	123 00	F	C	9 50
73	67	Marshall	B	12	8	7	" 18..	" 26..	20	122 75	F	D C	11 75
74	50	Equinox	B	11	9	4	" 27..	July 3..	22	121.25	M	L R	7.25
75	23	Gertrude	B	12	9	8	" 18..	June 23..	14	119.75	M	L S	10 50
76	9	Mrs Cleveland	P	12	9	7	" 24..	July 1..	20	118.00	M	L S	9 75
77	12	Chairs	P	12	10	5	" 17..	June 26..	14	118.25	M	D R	6.25
78	60	Sunnyside	P	12	10	7	" 27..	July 1..	20	118.00	M	S	6.25
79	74	Klickita	P	12	10	4	" 24..	" 3..	20	114 75	S	D R	6.00
80	63	Beverly	B	9	7	8	" 18..	June 26..	20	114.25	S	D C	11.50
81	80	Scarlet Ball	P	12	7	5	" 27..	July 5..	22	113.75	S	L R	11.25
82	....	Westlawn	P	10	10	8	" 25 .	" 1..	20	113.25	M	D R	9 75
83	2	Alton	P	11	10	6	" 18..	June 26..	14	111 60	F	D C	7.75
84	77	Fremont	B	12	7	4	" 27..	July 3..	14	110.75	M	L C	4.00
85	61	Timbrell	P	12	8	3	" 24..	" 3..	20	110.25	S	G R	11.50
86	106	Anna Forrest	B	12	6	6	" 18..	June 28..	20	108 75	M	G R	13.50
87	....	Gillespie	B	12	7	8	" 21..	" 26..	14	198 25	F	L S	11.75
88	....	Jessie	B	12	8	8	" 21..	" 28..	20	107.25	M	D R	13 50
89	71	Beauty	B	12	6	9	" 18..	" 26..	12	106.50	S	B S	13 50
90	28	Crescent	P	12	10	6	" 18..	" 28..	14	105 50	M	S	6.50
91	73	Gov. Hoard	B	12	7	6	" 21..	" 28..	20	105.25	S	L S	6 00
92	90	Jersey Queen	P	12	7	6	June 3..	July 3..	22	104.25	S	L S	12.50
93	....	Hersey	B	10	9	9	May 21..	June 26..	14	104 25	M	D C	5.75
94	91	Parker Earle	B	11	7	8	" 15..	" 23..	12	103 75	M	D C	8.50
95	88	Watson	P	12	6	4	" 25..	" 26..	20	102.00	S	C	6 50
96	....	Crimson Cluster	P	11	7	6	" 18..	" 28..	14	101.00	S	D C	9.75
97	..	Edith	P	8	5	8	June 2	July 1..	20	97.75	F	L C	23.50
98	93	Wicomico	P	12	7	9	May 24..	June 26..	12	96 50	S	D R	9.25
99	....	Princess	P	6	10	7	" 25..	" 28..	20	96 25	F	S	11.25

Varieties of Strawberries under test.—*Concluded.*

Rank.	Rank in 1896.	Varieties.	Sex { B. bi-sexual. P. pistillate.	Number of plants lived.	Vigor of growth—scale 1-10.	Freedom from rust—scale 1-10.	Date of first bloom.	Date of first picking.	Date of last picking.	Yield.	Firmness.	Color.	Weight of 50 average berries.
									July.	ounces.			ounces.
100	24	Swindle	P	11	7	3	May 21	July 3	20	96.25	S	D R	6.75
101	41	Smith's Seedling	B	12	10	7	" 14	June 26	12	93.75	M	D R	6.00
102	89	Oberholtzer's No. 2	P	12	10	7	June 2	July 7	22	92.50	F	L R	9 25
103	94	Auburn	P	12	10	9	May 31	June 28	12	91 00	F	B C	8.75
104	56	Lady Rusk	P	12	7	5	" 21	July 1	17	90 75	F	D C	7.75
105	11	Greenville	P	11	9	8	" 25	" 3	14	89 75	M	D R	6.50
106	75	Farnsworth	B	11	8	4	" 18	June 28	14	88.50	M	L R	8.25
107	....	Fountain	B	4	7	7	" 21	" 28	14	83.75	F	D C	11 50
108	....	Kossuth	B	12	10	3	" 14	" 28	12	83.50	S	D C	9.50
109	84	Stone's No. 7	B	12	10	3	" 18	" 28	20	81.00	S	C	8.00
110	82	Glenfield	B	12	10	5	" 15	" 23	7	79.25	M	D C	8 00
111	....	Huntsman	B	6	7	7	" 25	" 23	12	78 50	F	D C	9.50
112	85	Alpha	P	9	8	9	" 18	" 28	14	77 00	S	L S	12.00
113	..	Edward's Favorite	B	11	6	3	" 21	" 26	20	77.00	S	L S	11.00
114	57	Mary	P	12	9	6	" 25	July 5	20	74.25	M	L R	15.50
115	....	Beede's No. 1	B	7	8	9	" 24	June 28	14	67.25	F	D C	13.00
116	117	Clark's Early	B	11	7	4	" 21	" 23	12	65 50	M	D C	8 50
117	....	Irene	P	2	7	8	" 24	" 26	17	65.00	V F	D C	9 25
118	114	Wentzel	B	12	6	9	" 21	" 26	10	64 25	S	L R	9.50
119	29	Martha	P	12	10	7	" 21	July 3	14	63.50	M	D C	9 00
120	....	Belle of Lacrosse	B	12	7	7	" 25	" 1	22	61 00	M	L S	7.50
121	....	Annie Laurie	B	7	6	8	June 2	" 1	17	60 25	F	L C	13.00
122	....	Lady Franklin	P	9	8	7	May 25	June 28	12	60.50	M	L S	10.00
123	....	Howard's 25	B	10	8	8	" 18	" 26	12	60 25	S	D R	11.00
124	99	General Putnam	P	10	7	4	" 18	" 26	14	59.75	M	L S	12.50
125	83	Oberholtzer's No. 4	P	12	10	5	" 31	July 7	22	59.25	F	L R	10.25
126	...	Gov. Fifer	B	4	7	9	" 21	" 3	17	59.25	S	L R	7.00
127	....	Hiawatha	B	4	5	10	" 24	June 26	20	57.50	S	L S	13 50
128	....	Eleanor	B	2	9	6	" 25	" 26	12	56.50	S	B S	10.25
129	....	Columbian	B	8	10	5	" 24	" 28	14	51.25	M	L S	13.25
130	....	Steven's Early	B	12	7	3	" 18	" 23	7	49.50	F	C	4.00
131	....	E. P. Roe	B	11	7	5	" 24	July 3	22	48.00	S	G R	11.00
132	....	Leviathan	B	3	9	10	" 24	" 3	20	46.50	S	L R	10 00
133	109	Regina	P	12	7	8	" 27	" 5	20	43.50	S	B S	5.75
134	....	Gunton Park	B	3	6	3	" 15	June 23	12	35.00	S	D C	5.00
135	....	Berlin	P	6	7	8	" 25	" 26	10	34.25	M	D C	9.50
136	....	Royal City	B	3	7	6	" 24	" 26	12	32.50	F	D R	10 00
137	.	Beecher	B	7	8	10	" 31	July 3	12	30.50	S	L S	8.00
138	...	Leroy	P	2	7	9	" 24	" 1	20	29.50	S	D R	4.00
139	104	Price	B	12	8	4	" 15	June 28	10	28.00	M	D R	4.50
140	.	Little's No. 7	B	1	8	7	" 25	July 1	20	27.75	F	L S	
141	103	Accomack	B	12	6	8	" 18	June 28	12	25.25	S	L S	7.00
142	....	Westbrook	P	10	6	7	" 13	" 26	10	25.00	S	D C	3.00
143	....	Lady Thompson	B	4	7	6	" 25	" 28	12	18.75	S		
144	....	Iowa Beauty (fall planted)	B	12	....	9	" 24	" 23	5	16.00			
145	....	Cumberland	B	2	6	7	" 25	" 23	12	14.50	M	L R	
146	...	Alpine (everbearing)	B	12	5	8	" 7	" 23	Oct.	*14.50	S	wht	
147	....	Holland	P	2	5	6	June 4	July 10	17	9.50			
148	....	Laxton's No. 1	B	5	6	5	May 22	June 26	7	5.00	M		
149	111	Dew	B	3	5	8	" 28	July 3	7	4.50	S		
150	....	Meek's Early	B	2	6	8	" 14	June 23	3	3.50			

*One Picking.

In column two is given the relative positions of those varieties fruited in 1896 which had a full or nearly full stand of plants. The great change in position of many of these shows very clearly how little value should be placed upon the results of but a single test. It is only by the average of a number of trials that we can arrive at a reliable estimate of the value of a variety.



Ohio Centenial.
Hatch Experimental Station.
Princeton Chief.

Edgar Queen.
Mrs. Cleveland.
No Name.

Aroma.
Dr. Arp.
Klickita.

By the term "vigor of growth" is meant the ability of the plant to send out runners and make a full matted row. On ordinary soils the most vigorous varieties, graded ten, might well be planted two feet apart in the row and yet make a full matted row.

Strawberry rust (*Sphærella fragariæ*) may be prevented or held in check by spraying with the Bordeaux mixture; but in our experimental plots the plants were not treated, our purpose being to find out the susceptibility of the different varieties to the disease. By reference to column 6 it will be seen that many of the most productive varieties are the most susceptible to it.

The date of bloom, as noted in column 8, should be carefully noted by planters who wish to select bisexual varieties to fertilize the bloom of pistillates. The former should, if possible, be a little earlier than the latter, to insure the fertilization of all early blossoms.

The yields are recorded in ounces, this having been found to be the most accurate method of recording results. The yield in boxes may be approximately ascertained by reckoning sixteen ounces to a box.

The abbreviations under the heading "*Firmness*" are:—F., firm; V. F., very firm; M., medium; S., soft; V. S., very soft.

Those under the heading "*Color*" are: R. red, S. scarlet, C. crimson, and the qualifying adjectives, L light, D. dark.

The comparative size of the berries of the different varieties can be most accurately recorded by giving the weight of fifty average-sized berries. To ascertain this point, the weighing of each variety was made at its midseason for fruiting, that is at its fourth or fifth picking.

Early Varieties.

In the following list is given a few of those varieties giving the largest early yield, ranked according to their yield for the first week ending July 1st.

Rank.	Varieties.	Sex	Date of first picking.	Yield before July 1st.	Total yield.	Rank for total yield.
				Ounces.	Ounces.	
1	Van Deman	B	June 23	136.75	214.50	12
2	Bessie	B	" 23	73.25	154 75	41
3	Shuster's Gem	P	" 26	68.25	234.00	6
4	Michel's Early	B	" 23	65.75	131.00	63
5	Rio	B	" 23	61.25	134.75	59
6	Haverland	P	" 23	55.50	232.00	8
7	Ona	P	" 26	50.00	177.75	24
8	Smith's Seedling	B	" 26	47.50	93.75	101
9	Beauty	B	" 26	46.50	106.50	89

Late Varieties.

In the following list is given a few of these varieties giving the largest late yield, ranked according to their yield after July 12th.

Rank.	Varieties.	Sex.	Date of last packing.	Yield after July 12th.	Total yield.	Rank for Total yield.
				Ounces.	Ounces.	
1	Dominion	B	Ju'y 22	87.75	217.75	11
2	Equinox	B	" 22	68.00	121.25	74
3	Prince of Berries	B	" 22	55.50	192 50	19
4	Scarlet Ball	P	" 22	51.50	113.75	81
5	Hatch Expt. Stn. 24	B	" 22	47.25	151.50	45
6	Belle (Crawford's 51)	B	" 22	46.75	158.50	36
7	Princeton Chief	P	" 22	45.50	173.00	25
8	Edith	P	" 20	40 50	97.75	97

Edgar Queen.

Large Berries.

In the following list is given a few of these varieties bearing the largest berries, ranked according to the size of the berries.

Rank.	Varieties.	Weight of 50 average berries.	Firmness.	Rank for total yield.
1	Edith	23.50	F	97
2	Wm. Belt	16.75	F	7
3	Woolverton	16.00	M	5
4	Mary	15 50	M	114
5	Ruby	14.50	F	9

The accompanying photographs are all natural size, and are taken in most cases from medium sized berries.

Vegetable Garden.

Much as it might be desired, we have found it impracticable, for various reasons, to attempt systematic variety tests of the various kinds of garden vegetables. In this branch of the work, so far, we have had to confine our attention to the production of such crops as are desired, and in such quantities as are needed to supply the College tables.

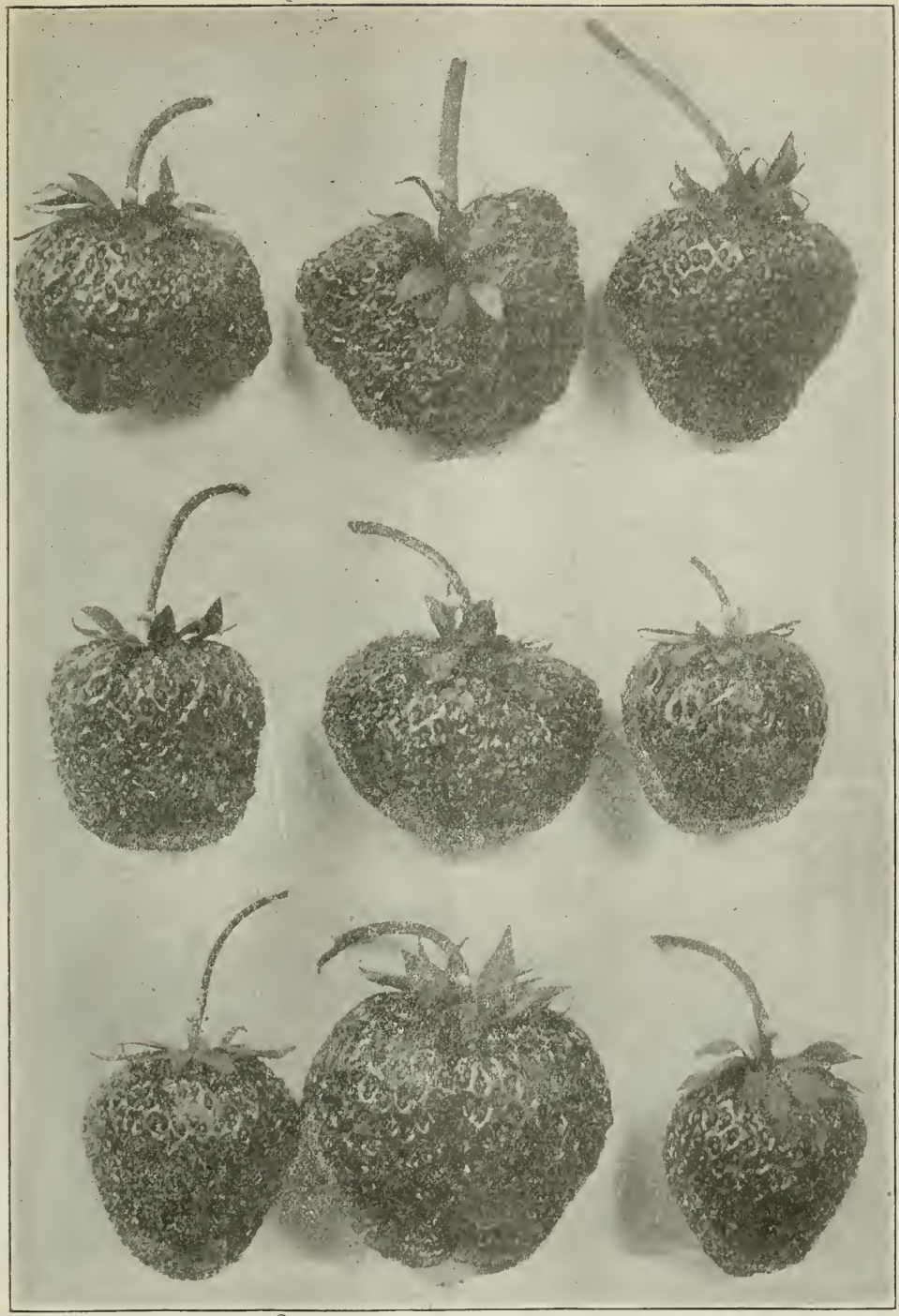
Formerly nearly all of the kitchen garden, comprising five and three quarter acres, was required for this purpose. Since, however, the garden has been underdrained and subsoiled, and a system of close cropping and rotation of crops adopted, we have been able to devote over one-third of this area to strawberries, and yet grow on the remaining two-thirds all that is required to meet an increased demand.

The fertility of the soil is maintained by heavy applications of stable manure, which can be obtained in large quantities from the city during the winter. The introduction into the rotation of strawberries, which are plowed under after the second crop, will, it is expected, greatly improve the friability, or mechanical condition, of the soil by means of the large amount of vegetable matter or humus incorporated with it. The value of friability, as well as of fertility, of the soil is readily understood by any one who has attempted to grow garden crops. With a friable fertile soil we seldom fail to get a good stand of plants, and a good crop if the season is at all favorable.

The past season has been a remarkable one, showing at different times all the extremes of heat and cold, wet and dry. These have had different effects upon the various garden crops. Nearly all of the root and vegetable crops requiring plenty of moisture have made a wonderful growth and are better than the average, but those crops requiring plenty of heat to develop and ripen their fruits, such as tomatoes, squashes, melons, etc., have not matured a full crop and have been much below the average. The growing of melons we have been compelled to discontinue, not only because of their uncertainty even in a favorable season, but because of their trying influence upon the morals of students.

Lawn and Grounds.

The labor expended upon the lawn and grounds of this or any other public institution cannot well be made to show a revenue, but that it pays from an educational as well as an artistic standpoint can hardly be disputed. The lack of attention paid by farmers generally to laying out and ornamenting the grounds surrounding their homes is a mistake which many of them do not fully realize. In many ways it would pay to give a little more attention to matters of this kind. It adds materially to the value of farm



Ruby.	Wm. Belt.	Williams.
Greenville.	Southard.	Shuster's Gem.
Barton's Eclipse.	Saunders.	Jocunda Imp.

property. It lends an interest to the country home which is better felt than expressed, and without doubt it is one of the means that may be employed to help keep the boys on the farm, by making the farm more attractive to them.

The college lawns and grounds are extensive—more so, perhaps, than we could expect to find throughout the country; still they are in keeping with the size of the college farm and with the number and size of the college buildings. They offer plenty of opportunity for study in landscape gardening, which students, after leaving here, can apply to suit the conditions on their own farms.

The frequent rains throughout the summer kept the lawn fresher and greener this year than it has been for many a year. There was also an abundance of bloom on many of the flowering shrubs, which added greatly to its beauty, and caused it to be generally admired and commented upon by the thousands of excursionists who visited the college during the month of June.

Considerable work has been done during the year in the way of improving the grounds. A great deal of filling, levelling, grading and seeding has been done on the grounds surrounding the sewage works, the engineer's house, and the new reservoir. The trees and shrubs which had become crowded at the front of the lawn were thinned out to give those left a chance for proper development, and in a number of clumps on the lawn, where there were vacant spaces, additional varieties of trees and shrubs were planted. The work of paving the sides of the drives has been pushed forward as much as possible, and a great deal along this line has been accomplished. This will avoid the formerly frequent expenditure of time and labor in repairing these drives, due to their being gullied out during heavy rains. A large quantity of screened gravel has also been added to many of the drives, which has put them in first-class condition.

One of the changes on the lawn of more than local importance has been the removal and destruction of all of the barberry bushes. It has long been an established fact that the barberry is a host plant for the rust which affects grain crops. That is, one stage in the life history of grain rust is passed on the leaves of the barberry. On account of the injury done here more or less every year by rust on the grain crops, it was thought best this year to root up and burn all the barberry bushes on the place. So that, although we were sorry to see them go, we committed to the flames three beautiful barberry hedg s and a number of fine specimen bushes of both the green and purple varieties.

Test of Varieties of Geraniums for Bedding.

Notwithstanding the many changes in the styles of ornamental bedding, and in the kinds of plants used for this purpose, the geranium still holds a front rank among bedding plants. There is, however, a great difference in the value of varieties. Some of those which are excellent for pot culture in the house are of little or no use for bedding, and likewise some of the most excellent bedding varieties make a very poor show under pot culture. The marked difference in this respect makes the subject one of importance to any one growing geraniums either in the house or outside for bedding. A test was begun this year with fifty-seven varieties to ascertain their relative values for bedding purposes.

Vigorous young plants were grown from cuttings taken last fall. These were first potted into three inch pots, then repotted during March into four inch pots. Early in the spring they were put into cold frames to "harden off," and four plants of each variety were set a foot apart in a well prepared flower border early in June.

Careful notes were taken throughout the season, a summary of which is given, hoping that it may be of interest not only to florists and towns-people but to farmers' wives throughout the country. The results of one year's tests cannot be considered definite, yet they will give some idea of the value of the varieties named. We hope to continue

Lovett.	Warfield.	Prince of Berries.
Beder Wood.	Tennessee Prolific.	Ona.
Muskingum.	Belle.	Bisel

these tests with the same and additional varieties, and have at the present time about 100 varieties in the greenhouse to ascertain their relative values for pot culture. The values given below are on a scale of points from one to ten:

Alfred Tennyson.—Plant 12 inches in height, compact and short jointed. Foliage medium size, dark green with distinct zone. Truss large on long flower stalk. Florets semi-double, light orange scarlet. Values—freeness of bloom, 10; beauty, 10; for bedding, 10.

Armand Sylvestre.—Plant 9 inches in height, compact, short jointed. Foliage medium size, dark green with faint zone. Truss medium in size on long flower stalk. Florets double, light lilac pink. Values—freeness of bloom, 7; beauty, 9; for bedding, 5.

Beatrice.—Plant 9 inches in height, weak grower. Foliage medium in size with fain zone. Truss small on medium flower stalk. Florets single, white shading to rose centre. Values—freeness of bloom, 7; beauty, 5; for bedding, 2. No use for bedding, but said to be excellent for pot culture.

Bijou.—Plant 8 inches in height, short jointed but of rather open habit. Foliage medium size, crinkled, glossy green with wide silver border. Truss small on short flower stalk. Florets single, bright scarlet. Values—freedom of bloom, 3; beauty, 5; for bedding, 8. Valuable for its foliage rather than for its bloom.

Buffalo Bill.—Plant 11 inches in height, compact but rather long jointed. Foliage large with faint zone. Truss large on long flower stalk. Florets double, dark centre, creamy white marbled with rose. Values—freeness of bloom, 7; beauty, 6; for bedding, 7.

Charles Lorelle.—Plant 10 inches high, rather long jointed and of spreading habit. Foliage large, dark green with distinct zone. Truss large on long flower stalk. Florets single, salmon rose with white eye. Values—freeness of bloom, 9; beauty, 10; for bedding, 7.

Cloth of Gold.—Plant 6 inches in height, compact dwarf habit. Foliage medium in size, light golden yellow. Truss small and loose on short flower stalk. Florets single, of light cerise (cherry) color. Values—freeness of bloom, 6; beauty, 5; for bedding, 9. Valuable on account of its golden foliage.

Copernic.—Plant 9 inches in height, compact, short jointed. Foliage medium in size without zone, does not stand the sun well. Truss medium on long flower stalk. Florets single, rosy carmine shading to salmon, with light border. Values—freeness of bloom, 9; beauty, 8; for bedding, 5.

Crystal Palace Gem.—Plant 7 inches high, dwarf, compact habit. Foliage medium in size, golden yellow with light green centre. Truss medium, loose, on long flower stalk. Florets single, of light cerise color. Values—freeness of bloom, 6; beauty, 5; for bedding, 10.

Dr. Leravasseur.—Plant 13 inches high, compact but rather long jointed. Foliage large with faint zone. Truss large on long flower stalk. Florets single, lower petals orange cerise, marked with lilac; upper petals lilac, veined with red and edged with cerise. Values—freeness of bloom, 8; beauty, 10; for bedding, 7.

E. Legoure—Plant 14 inches high, compact, short jointed. Foliage large, very dark green with distinct zone. Truss large on medium flower stalk. Florets semi-double, orange salmon, a shade darker than Mrs. E. G. Hill. Values—freeness of bloom, 8; beauty, 10; for bedding, 9.

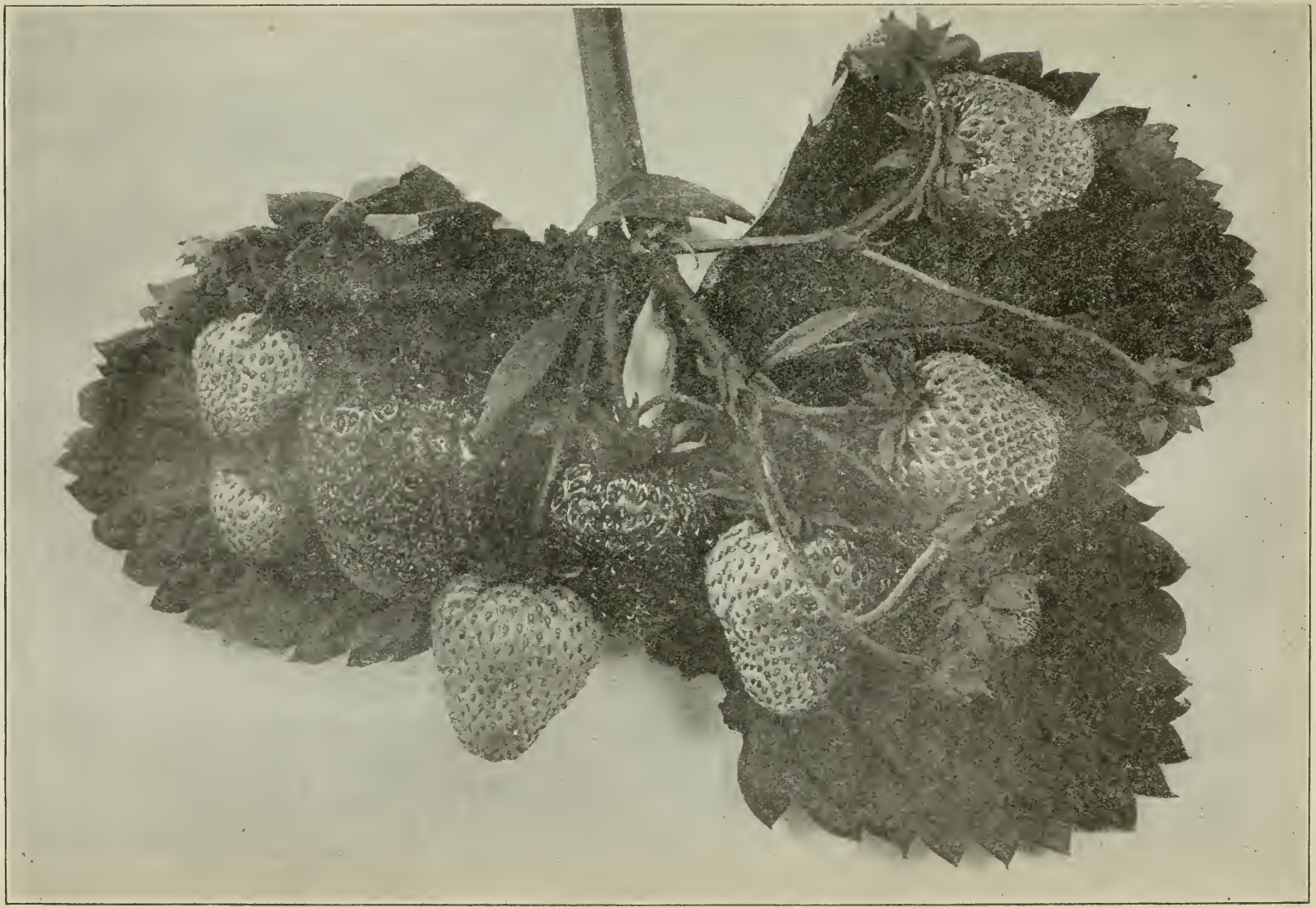
Emile de Gerardin.—Plant 12 inches high, compact habit, moderately long jointed. Foliage large and vigorous, dark green with no zone and few incisions in margin. Truss small on long flower stalk. Florets double, magenta pink, with light centre. Values—freeness of bloom, 9; beauty, 6; for bedding, 8.

Ernest Lauth.—Plant 10 inches high, moderately compact, rather long jointed. Foliage medium in size, bright green with no zone. Truss medium in size on long flower stalk. Florets double, bright magenta crimson. Values—freeness of bloom, 8; beauty, 5; for bedding, 7.

Fanny Thorpe.—Plant 11 inches high, compact, short jointed, Foliage large, very dark green, with very distinct broad zone. Truss large on long flower stalk. Florets single, pale rose white with darker centre. Values—freeness of bloom, 10; beauty, 7; for bedding, 9.

Flower of the Day.—Plant 7 inches high, dwarf compact habit. Foliage small, glossy green with creamy border. Truss small on short flower stalk. Florets single, bright scarlet. Produces very little bloom. Value for bedding, 6.

General Grant.—Plant 18 inches high, very vigorous, compact and short jointed. Foliage large, dark green with distinct zone. Truss large on long flower stalks. Florets, semi-double, brilliant scarlet. Values—freeness of bloom, 10; beauty, 10; for bedding, 10. The most popular variety of its color for bedding, but of little use for pot culture.



Tennessee Prolific

Gloire de France.—Plant 10 inches high, compact, short jointed. Foliage medium in size, dark green with distinct zone. Truss small on long flower stalk. Florets double, mottled white and lilac pink. Values—freeness of bloom, 4; beauty, 5; for bedding, 6.

Grand Chancellor—Plant 12 inches high, vigorous compact grower, short jointed. Foliage medium in size, light green without zone. Truss small on long flower stalk. Florets semi-double, rich dark crimson. Values—freeness of bloom, 7; beauty, 8; for bedding, 9.

Happy Thought.—Plant 7 inches high, compact, short jointed. Foliage small, light green with yellow centre. Truss loose, medium sized, on short flower stalk. Florets single. of pale cerise color. Values—freeness of bloom, 6; beauty, 5; for bedding, 10. Valuable on account of its beautiful foliage.

Henri de Bornier.—Plant 7 inches high, compact, short jointed. Foliage, pale green without zone; does not stand the sun well. Truss small on medium flower stalk. Florets double, pure white. Values—freeness of bloom, 4; beauty, 5; for bedding, 3.

Imogene.—Plant 12 inches high, compact, long jointed. Foliage medium in size, dark green, faint zone. Truss medium in size, on long flower stalk. Florets, single, pink shading to crimson centre. Values—freeness of bloom, 8; beauty, 6; for bedding, 8.

Ingenieur Parlier.—Plant 10 inches high, compact, long jointed. Foliage medium size, light green, no zone. Truss medium size, long flower stalk. Florets double, violet rose, upper petals scarlet. Values—freeness of bloom, 7; beauty, 9; for bedding, 10.

Jeanne d'Arc.—Plant 8 inches high, compact, short jointed. Foliage small, light green with faint zone. Truss small on long flower stalk Florets semi-double, rich dark crimson. Values—freeness of bloom, 5; beauty, 8; for bedding, 7.

J. J. Harrison.—Plant 10 inches in height, vigorous compact grower, short jointed. Foliage large, pale green with faint zone. Truss large, on long flower stalk. Florets very large, semi-double, of brilliant scarlet color. Values—Freeness of bloom, 8; Beauty, 10; for bedding, 10. A valuable new variety, rivalling General Grant in everything but size.

John Good.—Plant 15 inches high, vigorous, compact, short jointed. Foliage large, luxuriant dark green, with broad very distinct dark zone. Truss large on long flower stalk. Florets single, pale salmon color shading to dark salmon centre. Values—freeness of bloom, 10; beauty, 8; for bedding, 10.

La Favorite.—Plant 13 inches high, vigorous, compact but rather long jointed. Foliage large, pale green without zone. Truss medium size on medium length of stock. Florets double, pure white. Values—freeness of bloom, 8; beauty, 10; for bedding, 10. The most promising variety of its color.

La Vestale.—Plant 10 inches high, compact, short jointed. Foliage medium size, pale green, without zone. Truss large, on long flower stalk. Florets single, pure white. Values—freeness of bloom, 8; beauty, 10; for bedding, 8.

Leon Perrault.—Plant 11 inches high, of loose spreading habit, long jointed. Foliage small, dark green with faint zone. Truss large, loose, on long flower stalk. Florets single, brilliant scarlet. Values—freeness of bloom, 10; beauty, 10; for bedding, 8.

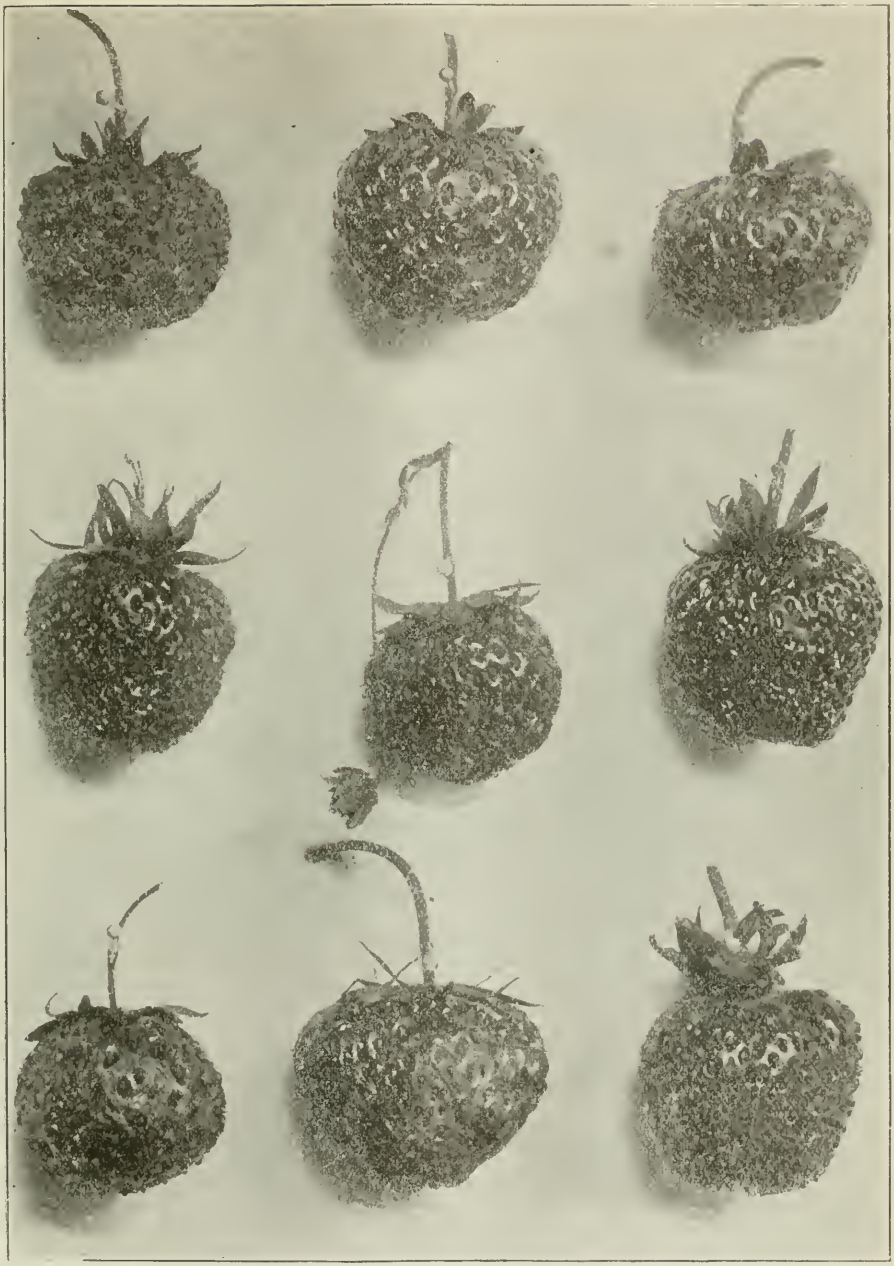
Lord Lytton.—Plant 10 inches high, of spreading habit, long jointed. Foliage medium size, pale green with faint zone. Truss medium size on medium length of stalk. Florets double, upper petals orange red, lower ones bright magenta crimson. Values—freeness of bloom, 5; beauty, 10; for bedding, 7.

Mad. Thibaut.—Plant 11 inches high, vigorous, compact, short jointed Foliage very large and luxuriant, glossy green without zone. Truss medium size, on medium length of stalk. Florets semi-double, magenta pink, with pale centre. Values—freeness of bloom, 9; beauty, 8; for bedding, 9.

Mad. Adrien Correl.—Plant 12 inches high, vigorous, compact, short jointed. Foliage large, pale green with distinct zone Truss large, on long flower stalk. Florets double, light magneta crimson. Values—freeness of bloom 8; beauty, 10; for bedding, 10. One of the best of its color for bedding and pot culture.

Mad Alfred Mame.—Plant 10 inches high, compact, short jointed. Foliage large, pale green, distinct zone. Truss large on long flower stalk. Florets very large, single, pale rose scarlet. Values—Freeness of bloom, 6; beauty, 10; for bedding, 10.

Mad. Amye de Cherreliere. Plant 11 inches high, of compact habit, short jointed. Foliage large, pale green, without zone Truss medium size on medium length of stalk. Florets semi-double, pure white, with red anthers. Values—freeness of bloom, 6; beauty, 10; for bedding, 8.



Anna Forest.
Oberholtzer No. 2.
Northern.

Dominion.
Standard.
Scarlet Ball.

Jersey Queen.
Marshall.
Mary.

Mad. Remy Martin.—Plant 9 inches in height, of dwarf compact habit, very short jointed. Foliage small, pale green without zone. Truss medium size, on medium length of stalk. Florets double, violet rose upper petals marked with white. Values—freeness of bloom, 10 ; beauty, 10 ; for bedding, 8.

Mad. Saleroi.—Plant 8 inches in height, of dwarf, compact, free branching habit, very short jointed. Foliage medium size, dark glossy green with narrow margin of silvery white. Produces little or no bloom, but is valuable on account of its beautiful foliage and compact habit of growth. One of the best of the silver leaved varieties for bedding.

Madonna.—Plant 13 inches in height, of a rather spreading habit, long jointed. Foliage large, pale green with no zone, and a little or no incisions on the margin. Truss very large, on very long flower stalk. Floret very large, single, of a beautiful soft shade of light pink. Values—freeness of bloom, 10 ; beauty, 10 ; for bedding, 10. One of the best of its color for bedding, and excellent also for pot culture.

Maréchal MacMahon.—Plant 11 inches high, of dwarf compact habit. Foliage medium size, of golden yellow color with a broad dark chocolate colored zone. Truss small, on short flower stalk. Florets single, bright scarlet Values—freeness of bloom, 2 ; beauty, 5 ; for bedding, 10. Valuable on account of its foliage, and ability to stand the sun.

Mary Hallock Foote.—Plant 15 inches high, compact, long jointed. Foliage large, luxuriant dark green, with distinct zone. Truss medium size, long flower stalk. Florets single, light salmon pink. Values—freeness of bloom, 5 ; beauty, 5 ; for bedding, 8.

Master Christine.—Plant 8 inches high, weakly, poor grower. Foliage small, pale green, without zone. Truss medium size on long flower stalk. Florets single, rosy pink with light centre, Values—freeness of bloom, 9 ; beauty, 7 ; for bedding, 2.

Mazeppa.—Plant 10 inches high, loose spreading habit, long jointed. Foliage not dense enough, medium in size, pale green, faint zone. Truss large and loose, on long flowerstalk. Florets single, carmine scarlet. Values—freeness of bloom 10 ; beauty, 10 ; for bedding, 8.

Memphis.—Plant 11 inches high, of spreading habit, long jointed. Foliage large, dark green with distinct zone. Truss large on long flower stalk. Florets single, brilliant scarlet. Values—freeness of bloom, 8 ; beauty, 10 ; for bedding, 10.

M. G. Meynot.—Almost if not identical with Mrs. E. G. Hill.

Mons. de la Rue.—Plant 10 inches high, compact, short jointed Foliage medium size, dark green, without zone. Truss medium size, on long flower stalk. Florets double, deep rich magneta pink Values—freeness of bloom, 9 ; beauty, 10 ; for bedding, 10.

Mrs A. Blanc.—Plant 12 inches high, spreading, long jointed. Foliage very large, dark green, distinct zone. Truss very large, on long flower stalk. Florets very large, single, deep rich salmon. Values—freeness of bloom, 7 ; beauty, 10 ; for bedding, 9.

Mrs. Cottle.—Plant 9 inches high, compact, short jointed. Foliage medium size, light green, faint zone. Truss large on long flower stalk. Florets large, single, bright rose scarlet Values—freeness of bloom, 7 ; beauty, 10 ; for bedding, 5. A seedling of Mrs. E. G. Hill, raised by Mrs. Thos. Cottle, Clinton, Ont. Has not done well outside this year, but is one of the most valuable of its color under pot culture.

Mrs. E. G. Hill.—Plant 13 inches high, compact, short jointed. Foliage very large, luxuriant dark green, distinct zone. Truss of immense size on long flower stalk. Florets very large, single dark salmon pink. Values—freeness of bloom, 10 ; beauty, 10 ; for bedding, 10 The best of its color for bedding ; excellent also for pot culture.

Mrs. Geo. Lorg.—Plant 11 inches high, compact, short jointed. Foliage medium size, with faint zone. Truss small on medium length of stalk. Florets double, light magneta pink with lighter colored centre. Values—freeness of bloom, 9 ; beauty, 8 ; for bedding, 7.

Mrs. J. M. Garr.—Plant 10 inches high of rather spreading habit, short jointed. Foliage medium size, not dense enough, dark green, no zone. Truss large, on very long flower stalk Florets single, pure white. Values—freeness of bloom, 10 ; beauty, 8 ; for bedding, 8.

Perle.—Plant 11 inches high, spreading, short jointed. Foliage medium in size, pale green, without zone. Truss medium size on long flower stalk. Florets single, pure white. Values—freeness of bloom, 5 ; beauty, 6 ; for bedding, 8.

Pierre Crozy.—Plant a hybrid between the Zonale and Ivy leaved Geraniums. Plant 6 inches high, spreading, short jointed. Foliage, small, light green, showing a little of the Ivy leaf. Truss, medium size, on long stalk. Florets, single, bright rose scarlet. Values—freeness of bloom, 10 ; beauty, 10 ; for bedding, 2.

Prokop Dauber.—Plant 14 inches high, compact grower, but rather long jointed. Foliage, medium size, pale green, distinct zone. Truss, large on long flower stalk. Florets, double, light rose scarlet. Values—freeness of bloom, 7 ; beauty, 10 ; for bedding, 10.

Oberholtzer No. 2.

Sam Sloan.—Plant 15 inches high, vigorous, compact, rather long jointed. Foliage, large, very dark green with faint zone. Truss very large, loose, on long flower stalk. Florets single, deep rich crimson. Values—freeness of bloom, 10; beauty, 9; for bedding, 10. A promising variety.

S. A. Nutt.—Plant 10 inches high, compact, short, jointed. Foliage, large, dark glossy green, faint zone. Truss, small, long flower stalk. Florets, double, very dark rich crimson. Values—freeness of bloom, 6; beauty, 9; for bedding, 10.

Sir Trevor Lawrence.—Plant 12 inches high, compact, short jointed. Foliage, medium size, crinkled, dark green, without zone. Truss, large, on long flower stalk. Florets, double, rosy pink. Values—freeness of bloom, 10; beauty, 10; for bedding, 8.

Van Dael.—Plant 10 inches high, weakly, spreading, short jointed. Foliage, large, dark green, no zone. Truss, large on very long flower stalk. Florets, single, light salmon rose. Values—freeness of bloom, 6; beauty, 8; for bedding, 5.

Ville de Poitiers.—Plant 13 inches high, vigorous, compact, short jointed. Foliage, large dark green, with faint zone. Truss, medium size, short flower stalk. Florets, semi double bright orange scarlet. Values—freeness of bloom, 5; beauty, 10; for bedding, 9.

White Swan.—Plant 10 inches high, compact, short jointed. Foliage, large, pale green, without zone. Truss, small, on short flower stalk. Florets, double, pure white. Values—freeness of bloom, 8; beauty, 8; for bedding, 10.

In the following list is given a few of the choicest bedding varieties in the different colors; their relative heights, an item of importance when different varieties are bedded together, may be found by reference to the foregoing list: *Scarlet*—General Grant, J. J. Harrison, Alfred Tennyson, Alfred Mame, Prokop Daubec. *Crimson*—S. A. Nutt, Sam. Sloan. *Magenta crimson*—Adrien Corret. *Pink*—Madonna, Mons. de la Rue. *Salmon*—Mrs. E. G. Hill, John Good. *White*—La Favorite, White Swan. *Bronze-leaved*—Maréchal MeçMahon. *Silver leaved*—Mad. Saleroi *Golden leaved*—Crystal Palace Gem.

Forest Tree Plantations.

The plantations of forest trees set out at different times here during the past twenty years have now become well established. They are not only a great ornament to the place, but they afford our students excellent opportunity for study along some of the important lines of forestry. A brief account of the present condition of one or two of these plantations may be of interest.

The oldest block of trees was set out about sixteen years ago, and is three acres in extent. It consists of maple, ash, elm, oak, hickory, butternut, walnut, basswood, mountain ash, pine, spruce, and larch. These were planted eight feet apart, on land too gravelly and rough for general field cultivation. They were cultivated as well as possible until about three years ago, when the trees had become so large that further cultivation was unnecessary. Last winter each alternate tree was cut out to give those remaining room for proper development.

A similar plantation of four acres was set out seven years ago on a rich, newly broken piece of ground on a steep hillside. These trees have made a remarkably fine growth, and have already become so large that further cultivation is unnecessary.

These plantations illustrate nicely the way in which rough and comparatively worthless lands may, with but little labor, be made to produce a crop which, in the course of a few years, will be of considerable value. There are thousands of such waste places and hillsides throughout the country which might with advantage be so planted. They would then become year by year of more value to the owners, and more than that, the influence of these numerous growing forests upon the climate and water supply of the country would be a benefit to the country at large.

The subject of forestry in many of its phases, and particularly those of preserving the forests and reforesting waste areas, is receiving yearly more and more attention at the hands of the various governments. During the past year we have commenced

Van Deman.	Splendid.	Arrow.
Beauty.	Bessie.	Rio.
Gertrude.	Michel's Early.	Kossuth.

two experiments along these lines—one at the request of the Clerk of Forestry for Ontario, and the other at the request of the Chief of the Division of Forestry of the Department of Agriculture for the United States.

The former experiment consists in mixing the seed of the White Pine (*Pinus strobus*) with buckwheat, and sowing the two together broadcast. The object being to ascertain the possibility of seeding large areas in this way to this valuable timber tree, the buckwheat being used as a "nurse crop" to shade the young pine seedlings, which are very susceptible to injury when exposed to the strong sunshine. Two pounds of the pine seed were mixed with a peck of buckwheat, and sown broadcast over about a quarter of an acre of ground. The land was prepared as for an ordinary grain crop, and the seed harrowed in after sowing. The results so far are not altogether satisfactory, as only a small percentage of the pine seed germinated. It may have been that the seed was too old, or that it had become too dry before sowing. At all events we hope to repeat the experiment another year.

The other experiment is a co-operative one, the nature and object of which may be best explained by giving a letter of the Acting Chief, Charles A. Keffer:

U. S. Department of Agriculture, Division of Forestry,
Washington, D.C., September 22nd, 1896.

Dear Sir,—Permit me to invite your co-operation in a simple experiment having for its object a study of the effect of locality on forest tree seedlings. As you are no doubt aware, there is a prevalent general idea that a species may grow successfully over a wide area when propagated from seeds taken within restricted limits, but that if seed grown in one part of its range be planted in a distant part the seedlings are less hardy than those of native origin.

It is desirable to know to what degree the leading economic species are thus affected by locality, and it is hoped from such a beginning other studies of equal practical bearing may be instituted.

It is proposed to gather, at each Station interested, a quantity of seed of each of the species named below. Each Station will keep a portion of each variety gathered, and send an equal quantity to all the co-operating Stations. The seeds are to be sown in nursery rows during the winter or early spring, and directions for the care, sowing and cultivation of seedlings will be sent from this office, in order that the conditions bearing upon these matters may be the same at all the Stations.

Records of growth, length of season, unusual influence (insect, fungus, meteorological, etc.) are to be kept. The following spring should show some results, and the experiment should be continued through five or more years, that the average climate may be represented.

The first year the species chosen, and the quantities to be planted at each Station, are as follows:

Negundo aceroides (Box-elder) ½ pint.
Juglans nigra (Black Walnut) 2 quarts.
Quercus macrocarpa (Bur Oak) 1 quart.
Fraxinus Americana (White Ash) ½ pint.
Fraxinus lanceolata (Green Ash) ½ pint.
Celtis occidentalis (Hackberry) ½ pint.
Gleditschia triacanthos (Honey Locust) ½ pint.

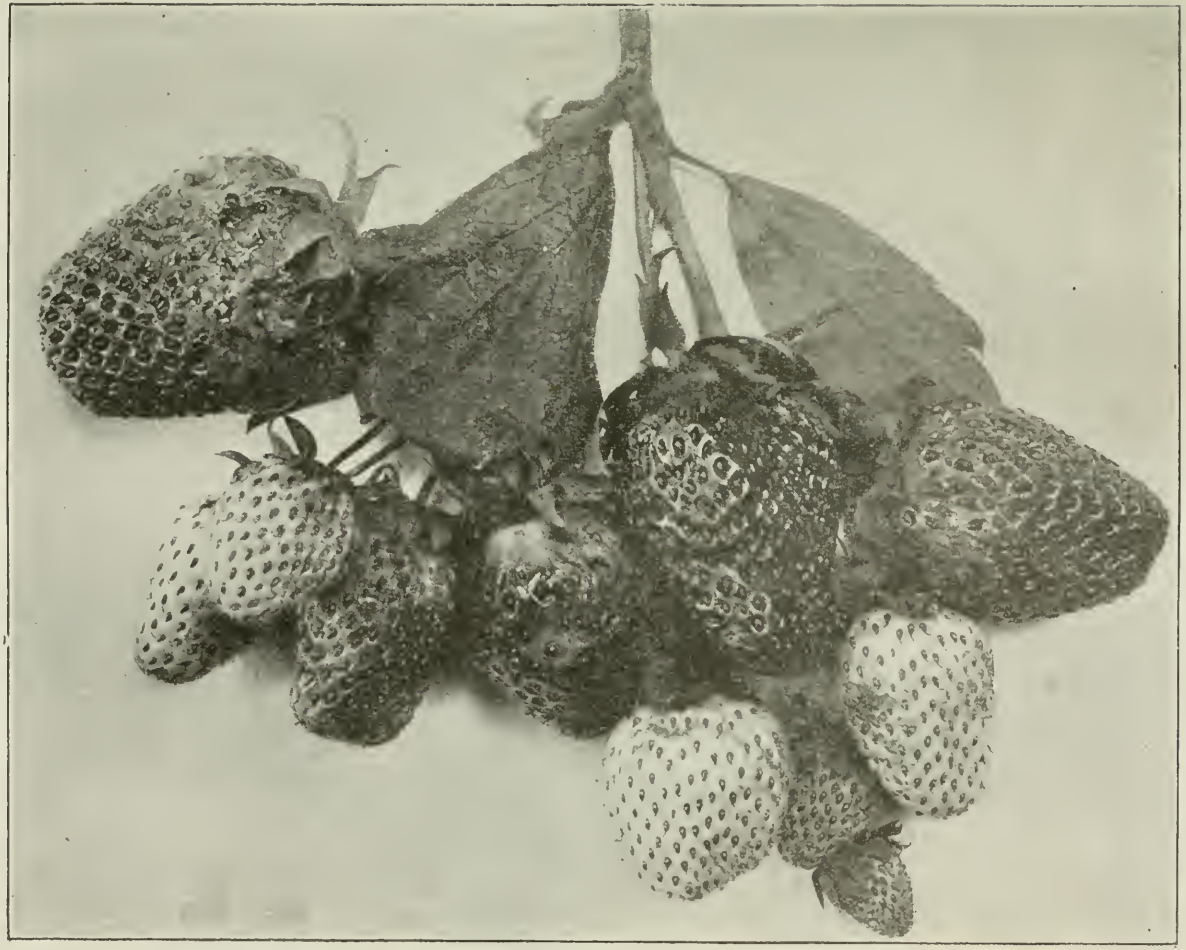
It is desirable that the following Stations should co-operate in this work, representing in general three north and south lines, and one east and west line. An East Appalachian line, consisting of the Stations in Vermont, Connecticut, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida.

An East Mississippi Valley line, consisting of the Stations in Alabama, Tennessee, Kentucky, Ohio and Ontario.

A West Mississippi Valley line, consisting of the Stations in Texas, Oklahoma, Kansas, Nebraska, South Dakota and North Dakota.

An East and West line, including New Jersey, Pennsylvania, Ohio, Indiana, Illinois, Iowa, Missouri, Kansas, Nebraska, Colorado, Utah, Nevada, and California.

Respectfully,
Charles A. Keffer.



HAVERLAND.

The seeds of all of the species mentioned in the circular could not be obtained here, but those that could be obtained were gathered and sent to Washington for distribution to the other co-operating Stations.

The accompanying tabular statement shows the States from which we received seeds, the species received from each State, the amount of seed which germinated, and the average growth in inches of the seedlings the first year. As yet any very definite conclusions cannot be made.

GERMINATION AND GROWTH OF FOREST TREE SEEDLINGS.

States.	Box-elder.	White ash.	Green ash.	Black walnut.	Bur oak.	Honey locust.	Hackberry.
Alabama	.....	.....	.....	v. p.	.....	v. g.	.....
	.....	.....	.....	$8\frac{2}{5}$	.....	$5\frac{1}{5}$	.....
California	.....	.....	.....	v. p.	.....	.....	.....
	.....	.....	.....	$8\frac{1}{5}$	.....	.....	.....
Colorado	v. p.	.....	g.	n.	.....	.....	.....
	$5\frac{1}{5}$	.....	$6\frac{4}{5}$	.....	.....	.....	.....
Connecticut	.....	v. p.	.....	.....	.....	.....	p.
	.....	3	.....	.....	.....	.....	$4\frac{2}{5}$
Illinois	v. g.	v. p.	v. p.	v. p.	n.	.....	.....
	$8\frac{4}{5}$	3	$6\frac{1}{3}$	2	.....	.....	....
Iowa	g.	.....	.....	.....	.....	.....	m.
	$11\frac{3}{4}$	.....	.....	.....	.....	.....	$5\frac{1}{5}$
Kansas	m.	.....	p.	.....	.....	p.	v. p.
	$8\frac{1}{5}$	.....	$6\frac{3}{5}$	.....	.....	$4\frac{3}{5}$	$5\frac{1}{5}$
Kentucky	.....	p.	n.	v. p.	n.	m.	m.
	.....	$5\frac{3}{5}$	.....	$8\frac{2}{5}$	.....	$4\frac{3}{5}$	$5\frac{4}{5}$
Missouri	n.	.....	.....	n.	.....	.....	.....
	.....	.....	.....	.....	..	.....	.....
Nebraska	g.	.....	v. p.	....	.....	.....	.....
	$8\frac{1}{2}$	.....	$5\frac{1}{5}$	.....	....	.....	.....
North Carolina	.....	.....	.....	g.	.....	.....	.....
	.....	....	....	$8\frac{3}{5}$	.....	.....	.....
Ohio	g.	.....	.....	n.	.....	p.	v. p.
	$8\frac{4}{5}$	.....	.. ..	.....	.....	$3\frac{1}{5}$	$4\frac{1}{5}$
Oklohoma	v. p.	.....	.....	.....	.....	.....	v. p.
	7	.....	.....	.....	.....		$3\frac{2}{5}$
Ontario	v. g.	v. p.	.....	g.	.....	v. g.	.....
	11	4	.....	$7\frac{3}{5}$	.....	$5\frac{3}{5}$	.....
South Carolina	.....	.....	.....	g.	.. ..	.....	p.
	....	..	.....	$10\frac{4}{5}$	.....	.....	$3\frac{3}{5}$
South Dakota	p.	.....	v. g.	.....	.....	.....	.....
	$6\frac{3}{5}$	.....	6	.....	.....	.....	.....
Tennessee	.....	.....	.....	v. p.	.....	.....	.....
	.....	.....	.....	10	.....	.....	.....
Texas	n.	....	v. p.	....	.....	.....	v. p.
	.....	.. ..	$4\frac{1}{5}$	.....	.....	.....	$3\frac{1}{5}$
Vermont	..	.....	.....	.....	n.	....	....
	.....	.....	.....	.....	.....	....	.....

Abbreviations used:—v. g.—Very good, where seemingly all of the seeds sprouted.
g.—Good, " three-fourths "
m.—Medium, " one-half "
p.—Poor, " one-fourth "
v. p.—Very poor, " very few "
n.—None, " none "

GREENHOUSES.

Great improvement has been made during the summer in the appearance of the interior of the greenhouses. All of the interior woodwork has been painted white, the ventilator shafting blue, and the walks gray. This gives the houses a clean, bright appearance, and affords better light for the growth of the plants.

WOOLVERTON.

In the tropical house, where the constant heat and moisture so quickly rots the woodwork, all of the old decaying wooden stages were taken out and in their places were put up neat, light iron stages made of gas-pipe and angle-iron. These are not only neater and more durable than the wooden stages, but will in the end be much cheaper.

Our collection of plants has been improved and increased, until it is now one of the finest and most extensive in the country. It embraces about 220 species, and over 1,000 varieties. A complete list of the species and varieties was compiled last winter, with a view to having all of the plants re-labelled with celluloid labels.

Inspection of Fruit Experiment Stations.

One of the pleasant duties devolving upon me, as head of this department, is the inspection of the various Fruit Experiment Stations now established in different parts of the Province, under the joint control of the College and the Ontario Fruit Growers Association. As far as possible, each station was visited at the most opportune time for seeing the particular kind of fruit grown at that station. The visits were thus made at different times, from June to September, the greater number of the stations, however, being visited during September.

A full account of the inspection of these stations will be given in the Fruit Experiment Station report. I am pleased to state, however, that good work is being done, and that great progress has been made at each station. All are now fairly well stocked with the different varieties of the kind of fruit under test. In most cases this young stock is making good growth; and as it comes into bearing, some valuable results may be looked for in the reports of the experimenters.

Co-operative Fruit Testing.

For the past four years, we have been distributing, in connection with the Experimental Union, small collections of a few of the leading varieties of small fruits for co-operative testing. Some idea of the nature of the work may be obtained from the following list of varieties offered to those wishing to join in the work last spring:

Strawberries—Haverland, Bubach, Woolverton and Van Deman—twelve of each.

Raspberries—Marlboro', Cuthbert, Shaffer's Colossal, and Golden Queen—six of each.

Black Raspberries—Souhegan, Greg, Palmer, and Hilborn—six of each.

Blackberries—Kittatinny, Snyder, Taylor, and Gainor—six of each.

Currants—Fay's Prolific, Victoria, Raby Castle, and White Grape—three of each

Gooseberries—Houghton, Downing, Whitesmith, and Industry—three of each.

Each person wishing to join in the work was allowed to choose one of the experiments, and was expected to properly care for the plants, and report at the end of each season on the growth and yields obtained. The supply of plants being limited to fifty lots for the first experiment and twenty for each of the others, the plants were distributed, as far as they went, in the order in which the applications were received. The demand for plants has been increasing each year, and was this year nearly double the supply. It may be well to mention here that the plants for these experiments are not grown at the College, but that we have a small grant with which they are purchased and distributed from different nurseries, where they can be more conveniently and cheaply grown. It is evident, therefore, that the demand for plants cannot be met without an increased grant. In the past, the unsatisfactory character of the reports from the majority of experimenters has not warranted us in asking for an increased grant for this purpose, nor permitted our publishing any definite conclusions as to the relative value of the varieties under test.

This year a greater number of the reports show that the tests have been carefully made, and it is hoped that some valuable conclusions may be reached. A fuller account of this may be looked for in the Experimental Union Report.

Bubach.

One of the important features of this work is that the plants distributed are among the leading varieties, and those who receive them get a start whereby they may propagate and increase these for themselves. Then again, some get a start in growing small fruits on the farm, which they would not otherwise get if they had to purchase the plants for themselves.

Correspondence.

One of the ever-increasing duties devolving upon the heads of the various departments here is the attention required in answering the questions of correspondents. The increased number of letters received each year, bearing upon all the different branches of horticultural work, may be taken as an evidence of the increased interest in this work throughout the country.

Meetings Attended.

During the month of January, I delivered addresses on various horticultural topics at Farmers' Institute meetings at the following places: Brucefield, Exeter, Ailsa Craig, Parkhill, Arkona, Petrolia, Brigden, Mt. Bridges, Coldstream, Ilderton, Lambeth, St. Marys, Kintore, Embro, Norwich, and Mt. Elgin.

Three lectures were also given before the teachers in training at the Normal School, Toronto. Two of them on the "Nature and Functions of the Parts of a Tree," and the other on "Floriculture in the Home and School."

Acknowledgements.

I beg leave to acknowledge the following donations to the Horticultural Department:

E. Collins, Horticultural Gardens, Toronto: nineteen varieties of chrysanthemums.

E. C. Pierson, Waterloo, N. Y.: half dozen "Dominion" gooseberry bushes.

F. W. Porter, Mt. Forest, Ont. seedling red raspberry bushes.

A. Morton, Brampton, Ont.: roots of "Stoat's Mammoth" rhubarb.

R. Brooks, Fergus, Ont.: collection of geranium cuttings.

J. Craig, Experimental Farm, Ottawa: plants of fifty varieties of strawberries.

J. Terrill & Son, Picton, Ont.: two apple pickers.

I take pleasure, also, in mentioning the efficient services rendered this department by William Squirrel, gardener and foreman of the outside work; and by Arthur James, florist and foreman of the greenhouse work.

Respectfully submitted,

H. L. HUTT,
Horticulturist

Ontario Agricultural College,
Guelph, Nov. 30th, 1897.

PART IX.

REPORT OF THE BACTERIOLOGIST.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to submit to you my third annual report.

TEACHING. During the winter term, lectures and practical demonstrations in dairy bacteriology were given to the special dairy class. This course comprised lectures on the structure and form of bacteria; methods of study; bacterial contamination of milk and methods of prevention; disease-producing bacteria in milk; fermentation of milk; pasteurization; bacteria in butter and in cheese. No laboratory work was attempted with this class, except in pasteurization; but all the lectures were illustrated by diagrams, charts, and lantern slides.

The third year specialists in Agriculture and Dairying also had a course of lectures on dairy bacteriology during the winter term, accompanied by a fairly broad course in laboratory practice, including the bacteriological analysis of milk, butter and cheese; and the third year specialists in Biology and Horticulture received lectures on cryptogamic botany, with extensive laboratory work on the parasitic fungi,—their classification, mode of life, effect on the host-plant, natural and artificial infection, preventive and combative measures, symbiosis, and a systematic presentation of the pathogenic fungi and bacteria.

The third year also finished the work which they had begun the previous fall term on the structure of plant tissues and organs; and the second year started with lectures and laboratory work in practical botany. Some of this work was continued into the spring term.

During the present fall term nearly all the time has been taken up by lectures and laboratory work; two afternoons per week with specialists in Bacteriology, Biology and Horticulture; two with the third year students in Vegetable Histology; and the remainder of the time with the botany of the third year for general and special courses, which we have taken because of Professor Panton's illness; Mr. W. A. McCallum, Fellow in my department, having taken the Physiological Botany, and the remainder of the work having been done by myself.

Owing to the larger number of students in the third year, and also to the fact that the special courses offered in the circular are being taken by one or more students the work of the coming term will be largely increased, and it will be impossible to carry on both class work and experimental work at the same time. Either is quite sufficient to engross one's whole attention; and when the attempt is made to divide up the available time between the two, one or the other is sure to be neglected.

LABORATORY WORK. In addition to the laboratory work with students, a considerable amount of special work has been done for farmers and others.

For instance: Seven samples of water were bacteriologically analysed, and the results reported to those sending them. Nine samples of milk or cream were also analysed.

Two of these were of cream that would not churn properly; three were of bad flavoured milk; and one was a sample of coloured milk, supposed to be due to a micro-organism. In the latter case, no colour-producing germ was found; but the presence of blood corpuscles was discovered in the sample. The other three samples were from milk variously affected with no specific troubles, but sent by persons who thought "something was wrong."

Other things sent for examination were fungi, foul-smelling cheese, diseased organs of animals, etc., etc.

Foul Brood. During the year, twenty-three samples of comb containing brood that was supposed to be diseased were sent to the laboratory for examination. Culture plates and microscopical examination were made and the results reported to those sending the samples.

The specimens received, came from California, Wisconsin, Minnesota, New York, Illinois, Pennsylvania, Virginia, Colorado, Ontario, New Brunswick, British Columbia and France.

In twenty-one cases, the Foul Brood germ (*Bacillus alvei*) was found, shewing the very wide distribution of this microbe. Other work in this line will be published in bulletin form at an early date.

Equipment. Owing to the large increase in the attendance of students, and the decision to manufacture tuberculin, it has been found necessary to make some alterations in our laboratory. The students' section has been enlarged by one hundred and forty-four square feet taken from the adjoining class-room, and a small room in connection with the experimental museum has been fitted up for incubators, sterilizers, and glassware; and, thanks to the liberality of the Minister of Agriculture, the equipment of the department has been considerably increased during the year. An electric Colt lantern, or stereopticon, for the projection of lantern slides on a screen, has been added; also four new Leitz microscopes, three expensive tables for the use of students, and a large amount of special apparatus for the manufacture of tuberculin.

Over 300 photographs were taken during the summer, finished in the laboratory, and lantern slides made from them. This involved a large amount of work, but it forms a nucleus of equipment which will be of much value for the illustration of lectures and the elucidation of many points which could not otherwise be made plain. We need twelve additional microscopes; and the demand for tuberculin is increasing so rapidly that it will be necessary to put in another incubator at once.

Meetings Attended. Farmers' Institutes were attended at Maberly, Balderson, Franktown, Easton's Corners, Toledo, Oxford Mills, Iroquois, North Williamsburg, and Hawkesbury. At these places, lectures were delivered from the following list of subjects:

"Bacterial Contamination of Milk," "Tuberculosis and the Tuberculin Test," "Pure Culture Starters for Butter," "The Bacteria of Leguminous Crops," "Water Supply on the Farm," "Practical Results of Bacteriology."

Also an address on "The Foul Brood of Bees," with a resumé of experiments performed during the year, was given before the Beekeepers' Association at Toronto.

Microscopic Botany. From April to October, Mr. W. A. McCallum's time was almost wholly taken up in the preparation of specimens for class-work in microscopic botany. During this time he collected and prepared material sufficient to last us for five or six years, and, as a consequence, we can now give a very thorough course of training in that branch of study.

Since the 1st of October, Mr. McCallum has assisted me in various kinds of laboratory work, and has rendered valuable service in the preparation of sections from the specimens mentioned above, for use in our daily class demonstrations. The following is a list of the different species prepared by Mr. McCallum, as stated in the first paragraph, from which sections have been made and will be made from time to time as required:

Stems

Exogens :

Wild Cucumber, Echinocystis lobata.
Ivy, Hedera helix.
Euphorbia, Euphorbia splendens.
Dogbane, Apocynum cannabinum.
Loosestrife, Lysimachia thyrsiflora.
Egyptian Lotus, Nelumbo speciosum.
Cockle, Lychnis vespertina.
Cucumber, Cucurbita pepo.
Rhuburb, Rheum sp.
Sunflower, Helianthus annum.
Bean, Phaseolus sativum.
Nettle, Urtica gracilis.
Dodder, Cuscuta Gronovii.
Camphor, Cinnamomum Camphora.
Maple, Acer saccharinum.
Apple, Pyrus malus.
Elm, Ulmus Americana.
Pitcher Plant, Sarracenia purpurea.
Cherry, Prunus Pennsylvanica.
Wild Ginger, Asarum Canadense.
Bracted Bindweed, Calystegia sepium.
Poplar, Populus tremuloides.
Pigweed, Amarantus retroflexus.
Viburnum, Viburnum sp.
Rubber Tree, Ficus elastica
Buckbean, Menyanthes trifoliata.
Grape Vine, Vitis vinifera.
Poppy, Bocconia sp.
Euphorbia, Euphorbia Cyparissias.
Milk Weed, Asclepias incarnata.
Water Milfoil, Myriophyllum verticillatum.
Bedstraw, Galium lanceolatum.
Buttercup, Ranuneulus repens.
Primrose, Oenothera biennis.
Water Lily, Nuphar advena.

Pine, Pinus sylvestris.
Lamb's Quarters, Chelidonium album.
Horse-Chestnut, Aesculus hippocastanum.
Basswood, Tilia Americana.
Celandine, Chelidonium majus.
Moon-Seed Vine, Menispermum Canadense.
Bittersweet, Solanum Dulcamara
Birch, Betula papyracea.
Oleander, Nerium Oleandes.
Rose, Rosa rubiginosa.
Clematis, Clematis Virginiana.
Willow, Salix nigra.
Bindweed, Convolvulus arvensis.
Catalpa, Catalpa Bignonioides
Honeysuckle, Lonicera parviflora.
Broom-Rape, Epiphegus Virginiana.
Oak, Quercus alba.
Corn, Zea Mays.
Cordylina, Dracoena Cordylina.
Club Moss, Lycopodium Clavatum.
Moonwort, Botrychuim Virginica
Bracken Fern, Pteris aquilina.
Acorus, Acorus calamus.
Umbrella Plant, Cyperus alternafolia.
Solomon's Seal, Smilicina racemosa.
Banana, Musa Cavendeshii.
Date Palm, Phœnix Daetilifera.
Horse-Tail, Equisetum arvense.
Smilax, Smilax hispida.
Selaginella, Selaginella sp.
Flag, Iris versicolor
Yucca, Yucca sp.
Calla Lilly, Richardia Etheopia.
Trillium, Trillium erectum.

Roots.

Salsify, Scorgonera hispanica.
Chicory, Cichorium Intybus.
Buttercup, Ranunculus repens.
Agrimony, Agrimonia Eupatoria.
Buckbean, Menyanthes trifoliata.
Pea, Pisum sativum.
Waterleaf, Hydrophyllum Virginicum.
Spruce, Abies nigra.
Mustard, Brassica Sinapistrum.
Orchid, Vanda coerulea.

Bladder Campion, Silene inflata.
Acorus, Acorus calamus.
Willow Herb, Epilobium augustifolium.
Screw Pine, Pandanus Veitchii.
Cinque-Foil, Potentilla Canadensis.
Bindweed, Convolvulus arvensis.
Golden Rod, Solidago Canadensis.
Lamb's Quarters, Chenopodium album.
Philodendron, Philodendron sp.

Leaves.

Scotch Pine, Pinus sylvestris.
Arbor Vitæ, Thuja occidentalis.
Norway Spruce, Picea excelsa.
Yew, Taxus Canadensis.
Sedum, Sedum aere.
Rue, Ruta graveolens.
Camphor, Cinnamomum Camphora.
Sundew, Drosera rotundifolia.
Flag, Iris versicolor.
Holly, Ilex opaca.
Echineria, Echineria sp.

Oleander, Nerium Oleander.
Tradescantia, Tradescantia zebrina.
Mullein, Verbascum Thapsus.
Narcissus, Narcissus sp.
Beech, Fagus ferruginea.
Rhododendron, Rhododendron sp.
False Mitre Wort, Mitella nuda.
Pitcher Plant, Sarracenia purpurea.
Tropaelum, Tropaelum majus.
Andromeda, Andromeda palifalia.
Laurel, Kalmia glauca.

LEAVES.—*Continued.*

Blue-weed, Echium vulgare.
Bean, Phaseolus sativum.
Fig-Tree, Ficus carica.
White Pine, Pinus Strobus.
Hemlock-Spruce, Tsuga Canadensis.
Cedar, Cedrus deodaria.
Larch, Larix Americana.
Water-Lily, Nuphar advena.
St. John's Wort, Hypericum perforatum.
Rubber-Tree, Ficus elastica.
Egyptian Lotus, Nelumbo speciosum.
Vanilla, Vanilla aromatica.
Australian Flax, Phormium tenax.
Wheat, Triticum vulgare.
Sago palm, Cycas revoluta.
Labrador Tea, Ledum latifolium.
Cockle, Lychnis vespertina.
Willow, Salix nigra.
Cotyledon, Cotyledon glauca.
Pansy, Viola tricolor.
Carnation, Dianthus sp.
Gloxinia, Gloxinia sp.
Bladder Campion, Silene inflata.
Duckweed, Lemna sp.
Bearberry, Arctostaphylos Uva-urs.
Auricaria, Auricaria sp.
Olive-Tree, Olea Europaea.

FLOWER BUDS.

(1.) Staminmate, to illustrate the Structure of Young Stamens:

Hemlock—Spruce, Tsuga Canadensis.
White Pine, Pinus Strobus.
Red Pine, Pinus resinosa.
Cycas, Cycas revoluta.
Tiger Lily, Lilium sp.
Indian Cucumber Root, Madeola Virginiana.
Juniper, Juniperus communis.
Scotch Pine, Pinus sylvestris.
Black willow, Salix nigra.
Wild Lily, Lilium Canadensis.
Bermuda Lily, Lilium Harrisii.
Marsh Marigold, Caltha palustris.

(2.) To illustrate the Structure of Ovules:

Cypress, Retinospora plumosa.
Wild Lily, Lilium Canadensis.
Marsh-Marigold, Caltha palustris.
Mallow, Malva rotundifolia.
Dog-Toothed Violet, Erythronium Americanum.
Japan Quince, Pyrus Sidonica.
Yucca, Yucca sp.
Toothwort, Dentaria diphylla.
Spring Beauty, Claytonia Caroliniana.
Arbor Vitæ, Thuja occidentalis.
Poplar, Populus tremuloides.
White Pine, Pinus strobus.
Mandrake, Podophyllum peltatum.
Blood-Root, Sanguinaria Canadensis.
Willow-Herb, Epilobium augustifolium.
Dandelion, Taraxacum officinale.
Juniper, Juniperus Canadensis.
Calla Lily, Richardia Etheopia.
Pitcher Plant, Sarracenia purpurea.
Norway Spruce, Picea excelsa.
Bracted Bindweed, Calystegia sepium.
Purple Trillium, Trillium erectum.
Yellow Violet, Viola pubescens.
Neckweed, Veronica peregrina.
Zamia, Zamia sp.
Bermuda Lily, Lilium Harrisii.
Pine, Pinus austriaca.
Laurel, Kalmia glauca.
Strawberry, Fragaria vesca.
Bellwort, Uvularia grandiflora.
Barren Strawberry, Waldensteinia fragaroides.

GROWING POINTS OF SHOOTS.

Corn, Zea Mays.
Club Moss, Lycopodium clavatum.
Norway Spruce, Picea excelsa.
Artichoke, Helianthus tuberosus.
Bracken Fern, Pteris aquilina.
Loosestrife, Lysimachia thyrsiflora.
Ash-Leafed Maple, Negundo aceroides.

ROOT TIPS.

Pea, Pisum satinum.
Maple, Acer saccharinum.
Phelodendron, Philodendron sp.
Corn, Zea Mays.
Bracken Fern, Pteris aquilina.
Acorus, Acorus calamus.

EMBRYOS.

Water Lily, Nuphar advena.
Flag, Iris versicolor.
Maple, Acer saccharinum
Cycas, Cycas revoluta.
Nigella, Nigella sp.
Corn, Zea Mays.
Wheat, Triticum vulgare.

The Effect of Spraying Bordeaux Mixture on Foliage.

In Bulletin 86 of the Cornell Experiment Station, E. G. Lodeman makes the statement that the large number of applications of Bordeaux mixtures applied at that institution during the year 1894 seemed to have an influence upon the thickness of the foliage. "On October the 15th," he says, "leaves were taken from sprayed and unsprayed trees of three varieties of plum—*Fellemberg*, *Bradshaw* and *German Prune*,—five leaves from each lot, and in all cases from corresponding portions of the trees. In making the sections the material was uniformly cut from near the midrib, in the vicinity of the centre of the leaf, so that no error might creep in under this head. The average measurements were as follows:

Fellemberg— sprayed—10.6 micromillimetres } A gain of 1.9 per cent. from
" —unsprayed—10.4 " } spraying.

Bradshaw— sprayed—10.9 micromillimetres } A gain of 2.8 per cent. from
" —unsprayed—10.6 " } spraying.

German Prune— sprayed—12.9 micromillimetres } A gain of 10.2 per cent.
" —unsprayed—11.7 " } from spraying.

(A micromillimetre = .000039 of an inch.)

"The difference between the sprayed and unsprayed foliage, although slight in the first two cases, was, nevertheless, in favor of the sprayed foliage. This is plainly shown in the case of the German Prune. The particular cells of the plum leaves which were enlarged could not be determined with certainty, but the palisade cells appeared longer in the sprayed leaves."

These statements aroused my curiosity, and I suggested the matter to Mr. J. C. Macdonald, one of our third year students, as a line of investigation which he might pursue with interest and profit to himself and others. He commenced the work in January last, and the result of his investigation may be briefly stated as follows:

It is a well known fact among those who have sprayed with the Bordeaux mixture, that if the quantity of lime is not sufficient to neutralize the acid properties of the copper sulphate, the leaves to which it is applied will be scorched or burnt by the acid; hence, one of the objects of the experiment has been to determine the comparative effect of mixtures containing different quantities of lime.

Twelve seedlings, having an average height of twenty inches, were used for the experiment. They were potted and placed in the green houses in the first week in January, and forced into leaf. On February 10th, the first leaves had attained about half their normal size, and the first spraying was done.

The seedlings were paired as closely as possible, according to size and species; one of each pair was sprayed, and the other was left unsprayed as a check plant. The six pairs were divided into three lots of two pairs each for treatment with Bordeaux mixtures of different compositions.

Unsprayed Numbers.	*Sprayed Numbers.*		
1	2 (pear)	sprayed with	$4\frac{1}{2}$ lbs. copper sulphate. 2 lbs. lime. 40 gallons of water.
3	4 (pear)		
5	6 (peach)	sprayed with	$4\frac{1}{2}$ lbs. copper sulphate. 4 lbs. lime. 40 gallons water.
7	8 (quince)		
9	10 (pear)	sprayed with	$4\frac{1}{2}$ lbs. copper sulphate. $3\frac{1}{2}$ lbs. lime. 40 gallons water.
11	12 (pear)		

A small atomizer, such as is used for throat troubles, was used in order to ensure an even wetting of the surfaces of the leaves. Four successive applications were made on February the 10th, 16th, 23rd, and March 1st, respectively.

On March the 10th, specimens of leaves, corresponding in size, age. and position on the stem, was taken and put through the process of imbedding in paraffin, in order that sections of exactly the same thickness might be made of them. The plants were afterwards sprayed on March 16th, March 24th, and April 5th ; and leaves were again selected in the same manner and imbedded by the same methods.

Transverse sections across the central part of the leaf were cut out with a microtome : so that the sections were of the same thickness.

No noticeable changes were observed in the foliage of the plants, until the time of the fifth application, when numbers two and four, which had been treated with the mixture containing the small amount of lime, appeared somewhat crumpled, but did not turn black. A critical examination and comparison of all the plants after the last spraying, revealed a marked difference between the color of the sprayed and the unsprayed plants. Those treated with the excess-of-lime mixture were decidedly greener than the unsprayed ones, while those treated with the neutralized, or second, mixture also showed a deeper green, though not so marked as in the previous case. A microscopic examination of the leaves of Nos. two and four, which were treated with the unneutralized solution, failed to distinguish any gain in the amount of chlorophyll in the cells. So the experiment seems to prove that the increased greenness of the foliage was in direct ratio to the quantity of lime used, and an examination of sections of the leaves under the microscope bore out the observation made on the external appearance. The most noticeable feature was the increase in the number of chlorophyll granules, both in the palisade cells and in the spongy parenchyma of the sprayed leaves. Thus, the increase was in proportion to the amount of lime used. The drawing in figure B illustrates the gain of the leaves sprayed with the excess of lime, over the unsprayed leaves. The chlorophyll of the sprayed leaves was also a brighter green than that of the unsprayed.

In many places the treated leaves showed a third layer of palisade cells more or less continuous ; in the untreated leaves, nothing more than a few scattered palisade cells were seen in addition to the usual double layer.

Measurements of the thickness of the leaves were made by means of the micrometer, from six to twelve of each leaves having been taken. The results in averages were as follows :

No. 1 (plum) unsprayed, 141 micromillimetres	..	Difference=4.2 mmms.
No. 2 " sprayed, 136.8 "	..	Loss from spraying=3 per cent.
No. 3 (pear), unsprayed, 177.6 "	..	Difference=4.2 mmms.
No. 4 " sprayed, 181.8 "	..	Gain from spraying=2.3 per cent.
No. 5 (peach), unsprayed, 123 "	..	Difference=9 mmms.
No. 6 " sprayed, 132 "	..	Gain from spraying=7.3 per cent.
No. 7 (quince), unsprayed, 169.3 "	..	Difference=1.1 mmms.
No. 8 " sprayed, 168.2 "	..	Loss from spraying=.6 per cent.
No. 9 (pear), unsprayed, 162.1 "	..	Difference=12.1 mmms.
No. 10 " sprayed, 174.2 "	..	Gain from spraying=7.5.
No. 11 " unsprayed, 168.2 "	..	Difference=18 mmms.
No. 12 " sprayed, 186.2 "	..	Gain from spraying=10.7 per cent.

It might be explained, that in the case of the quince, No. 7 was a much more vigorous plant than No. 8.

While the wide variations shown are somewhat unsatisfactory ; yet there is sufficient data to indicate a gain from spraying and an additional increase of thickness where an excess of lime was used.

Transverse sections of Pear leaves—A, unsprayed; B, sprayed—to show difference in width and comparative difference in the numbers of chlorophyl corpuscles in sprayed and unsprayed leaves.

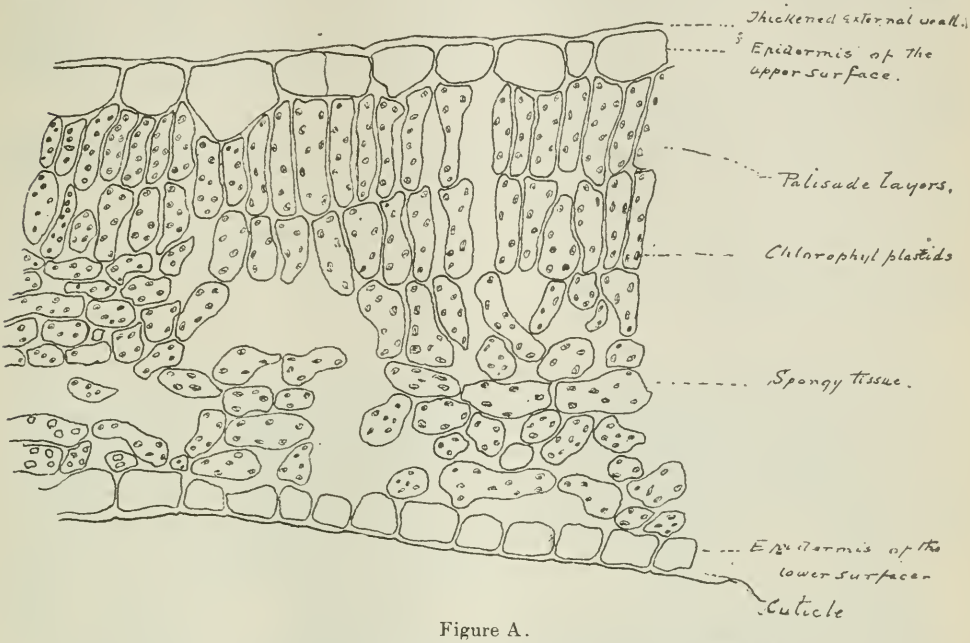


Figure A.

Transverse section of Pear leaf, enlarged 590 times. *Unsprayed.*

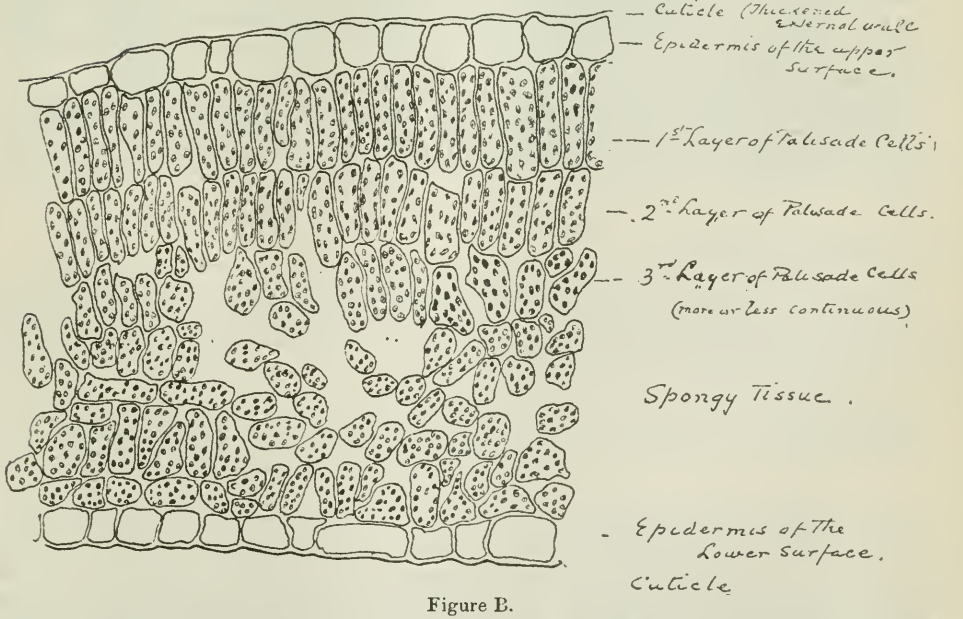

Cuticle (Thickened external wall)
Epidermis of the upper surface.
1st Layer of Palisade Cells
2nd Layer of Palisade Cells.
3rd Layer of Palisade Cells (more or less continuous)
Spongy Tissue.
Epidermis of the Lower Surface.
Cuticle

Figure B.

Transverse section of Pear leaf, enlarged 590 times. *Sprayed* with Bordeaux Mixture (4½ lbs. copper sulphate, 8 lbs. of lime and 45 galls. of water).

These experiments conducted in the greenhouses, where most of the conditions were under control, give perhaps more valuable results than if they had been carried on in the open air, as rain and other atmospheric disturbances which would affect the plants, were entirely avoided. A steady temperature; a regular supply of water, without washing the leaves; an even spraying of the leaves with an atomizer,—all went to secure uniformity of surrounding influences. On the other hand, the dews, which are deposited on outdoor plants, might have the effect of bringing into solution some of the compounds of the dried residue of the mixture adhering to the leaves.

The results, on the whole, confirm Lodeman's statements, that the increased thickness of the leaf resulted from spraying with Bordeaux mixture, and that the thickness was probably due to an increase in length of the palisade cells.

Lodeman's[1] measurements, however, are manifestly wrong, as the plum leaves examined by him are stated to be "from 10.4 to 12.9 micromillimetres in width, or about the same width as the length of a good-sized microbe." Leaves would be very flimsy structures if this were the case.

With regard to the increased greenness of the foliage, it is well known that calcium is specially abundant in the leaves of green plants,[2] and it is probable that some of the calcium of the line in the Bordeaux mixture is absorbed by the leaves. Boussingault[3] found that if calcium sulphate be placed on the leaf of a plant it will disappear in a few hours, and sooner on the lower than the upper surface. Further, the effect of depriving plants of calcium as an ingredient of their food supply is well shown in all text-books on Physiological botany[4]. Hence, it is not improbable that the increased greenness in the leave sprayed with an excess-of-lime, is caused by the leaves absorbing an excess of calcium.

Conclusions

Bordeaux mixture has an invigorating effect on leaves, as evidenced by the increased thickness and the marked development of chlorophyll granules in the cells.

This increased vigor is of much importance, as a strong healthy plant is always in a much better condition to withstand the attacks of fungus diseases than a weakly one.

Instances of losses from improperly made Bordeaux mixtures indicate that a lack of sufficient lime may result in injury. Crumbling of the leaf resulted in Nos. 2 and 4 from lack of sufficient lime.

An excess of lime gave better results than smaller amounts. The leaves seem able to take up some of the lime; and additional lime gives the foliage increased vigor. Hence it might be advisable to use larger amounts of lime than are generally used in the mixture.

The increased thickness of the leaf is probably due to the increased development of the palisade layers of cells.

References: 1. Lodeman, Cornell University Agricultural Experiment Station Bulletin 86, 1895; 2. Vines, Physiological Botany; 3. Boussingault, Ann. Chem. Et. Phys. Ser. V., Vol. 13; 4. Sachs, Physiological Botany; Johnson, How Plants Grow; Vines, Physiological Botany: Soraurer, Physiology for Gardeners.

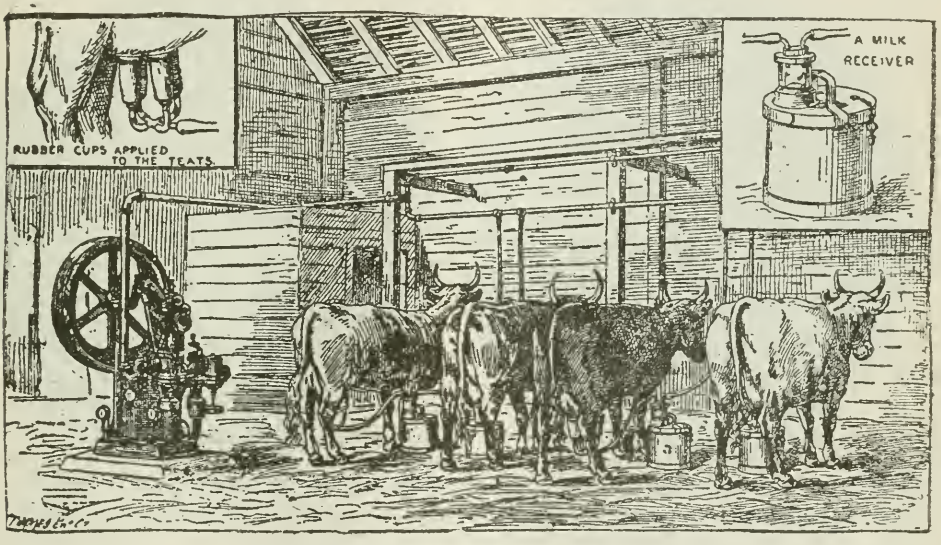
Machine-Drawn Milk *versus* Hand-Drawn Milk.—Some Bacteriological Considerations.

The Thistle milking machine was invented by Alexander Shiels, M.B. C.M., B.Sc., of Glasgow, and is now being manufactured in the same city by a company. The machine is a large air pump of special and peculiar construction. A suction pipe passes from the pump through the wall into the stable and overhead to the passage between the two rows of cows. From this main tube two smaller copper tubes are carried along on top of the stall divisions, one above the necks of each row of cows. At the side of each cow

there is an opening in this cross tube from which a short piece of smaller copper tube points downwards, slanting toward the passage behind the cows. This smaller piece of tube in each stall is controlled by a stop cock, and to it a rubber tube is attached when milking begins. This movable rubber tube extends down to a heavy, broad-bottomed tin pail on the floor, and another rubber tube connects the pail with the teat-cups which are attached to the udder.

For milking each cow a pail and a set of teat-cups are used; and as it takes less time to milk some cows than others, when a cow is milked, the man in charge shuts the stop-cock, detaches the rubber tube, empties the pail into a large milk can standing close by, removes the apparatus (the rubber tube, pail and teat-cups) to another stall, and places them in position to milk another cow.

As the milk pail is heavy, broad, and low, it is difficult to upset. The cover is soldered on and the milk enters through a strong glass bottle which is inserted like a cork into the lid at one side, resembling a bottomless quart fruit jar, but only about half the length. By observing the glass bottle, one can see how the milk is flowing from the udder and know when to stop milking.



Thistle Milking Machine in Operation.

Owing to the action of a reducing valve, which is used for the admission of air at regular intervals, the suction acts as a series of successive pulsations, resembling the action of the mouth of a calf in sucking, or the hand in milking, and varying in the proportion of fifteen to five. As the suction increases the teat cup contracts first at the top and then gradually downwards to the bottom, forcing the milk out of the teat; when it reaches the maximum of fifteen, air is admitted which reduces it to five, thereby partially releasing the teat and allowing it to fill with milk again. In this way the milking is done naturally, quickly, thoroughly, and without any annoyance to the cow. The machine operates more regularly than the hand.

The above is taken from a description given by Dr. Mills in 1895; and at the same time the President hazarded the opinion, "that it makes it next to impossible for any kind of dust or dirt to get into the milk during the progress of milking."

At a meeting of the Glasgow Dairymen's Association in 1895, a number of speakers expressed the opinion that the use of the machine guarded against all dirt, that the "machine milk" would be absolutely filth free, and that consequently little or no souring would occur.

So, to settle the question, I decided to investigate the matter by bacteriological methods; and I was very sanguine before I commenced the work, that the machine had struck a death blow to hand milking. The results of the following experiments, however, have conclusively proved otherwise.

During the investigation, a paragraph in *The Dairy World*, of London, England, was brought to my notice. It recorded the results of a milking machine competition for a prize of £50 offered by the Highland and Agricultural Society for the best machine. There were two entries. The Thistle Mechanical Milking Machine Co. entered two, and Mr. Murchland, of Kilmarnock, entered his machine.

With regard to the keeping qualities of the milk the judge reported as follows: "In every instance the samples of milk drawn by the Murchland milking machine were found to keep satisfactorily; after a lapse of forty-eight hours they were perfectly sweet, and in no respect inferior to the samples drawn by hand. The chief defect in the Thistle milking machine was the effect it had upon the keeping qualities of the milk. Most of the samples from it developed sourness in from twelve to fourteen hours, while samples drawn by hand from the same cows at the same time, and kept under precisely the same conditions, remained perfectly sweet for from thirty-six to fifty hours."

One of the Thistle milking machines, operated by steam power, has been in more or less constant use in our dairy stable at Guelph during the past summer.

So far as I am aware, no bacterial tests have hitherto been made of the milk from any of the machines mentioned; therefore, as opportunity presented itself, and as considerable importance is attached to the keeping qualities of milk, the subject was taken up in our laboratory and investigated at some length.

The questions that suggested themselves were as follows:

1. Is the milk from the Thistle milking machine more free from germs than milk drawn by hand?

2. What difference is there between the kinds of bacteria in machine milk and those in hand milk?

3. Is machine milk adapted for town or city supply? For butter-making? For cheese-making?

By arrangements made at the dairy stable, the machine milk was kept entirely separate from the hand milk, and samples were taken from the mixed milk of those cows milked by the machine and also from the mixed milk of those cows milked by hand. These samples were taken from the stable to the laboratory and bacteriologically analyzed, in order to ascertain the number, as well as the kinds, of germs present in the different samples. The morning's milk was never more than two hours old and the evening's milk never more than half an hour old when it was analyzed.

A large number of analyses of both machine and hand milk were made from April to August, and the results obtained are shown in the table as weekly averages. The number of analyses per week is stated in the adjoining column.

From a glance at the table, it can be seen at once that the machine milk has a far larger germ content than that milked in the usual manner; and, as it has been time and again proven, the number of germs in milk is dependent on its cleanliness—the more dirt, the larger the number of germs. Making a direct comparison between the number of germs in machine milk and the number of germs in hand milk, we note that the proportion varies greatly, from three to twenty times as many bacteria being found in the machine milk as in the hand milk.

There is considerable weekly variation, due partly to difference in feed, surroundings and temperature.

The large number of bacteria found in the machine milk may be attributed to three causes:

1. When the rubber teat-cups are fastened on the cow, a small portion of the hairy coat of the udder is included in the cup, and no matter how clean the animal is, germs are

sure to be present on this coat in considerable numbers, depending on the cleanness of the udder.

These germs come chiefly from the bedding and dried manure, and in various ways find lodgment on the hairy coat of the animal. Experimental proof of this can be easily made. Take a single hair from an animal, lay it on some medium suitable for bacterial growth, and a surprisingly large number of germs will develop from it. (See Fig. C). For further information on this point, see page 109 of the Ontario Agricultural College Report for 1896.

When the suction of the machine is applied, the force exerted naturally draws any loose or dry particles that may be on the teats and that portion of the udder within the cups, down into the milk. In this way, the myriads of germs on these particles gain access to the milk and find in it suitable conditions for their growth and multiplication. The infection from this cause might, we think, be in a large measure prevented by thoroughly wiping the teats and udder with a well damped cloth or sponge immediately before milking.

A hair from the udder of a cow. Figure C. A hair from the body of a cow.

In these illustrations, each white spot represents a colony of bacteria that has developed from a single germ. Each colony is made up of myriads of individuals.

NOTE.—The gelatine was *liquefied* along the hair, in right hand figure, showing the presence of putrefactive germs.

2. The teat-cups and the connecting tubes to the milk pail are made of rubber and consequently cannot be scalded or steamed, as scalding or steam would crack and spoil the rubber; hence it is impossible to cleanse them thoroughly from germ life. They may *look* clean after being rinsed in warm water and kept in cold water; but they are certainly not bacteriologically clean, *i. e.*, free from germs; and in the process of milking many of the germs on the inside of the rubber and in the crevices of the tubing are washed down into the milk. Conclusive evidence of this is afforded by the fact that, time and again, germs that were constantly present in the pure water in which the rubber tubing was kept between milkings, were also found in the milk.

3. In detaching the cups from one cow and putting them on another, attendants sometimes let them fall upon the floor of the stable, and in this way germ-loaded particles of dust and dirt get into the teat-cups, and find their way into the pail as soon as the milking of the next cow begins. Of course, this may be put down to carelessness on the part of the attendants; but, in our experience, no matter how carefully the transfer was made from one cow to another, instances of the cups falling occured from time

to time, and each time undoubtedly made a larger addition to the germ contents of the milk.

It will be seen from table below that the average number of germs per cubic centimetre in the morning's milk from the machine for sixteen weeks was 141,595, while the average in the hand milk for fourteen weeks was 10,619,—a result largely in favor of the hand-milk. The average for the evening's machine-milk was 165,033 and for the hand-milk, 12,890,—a result almost as much in favor of the hand-milk.

Quantitative analysis of milk drawn by the Thistle milking machine and milk drawn by hand :

Week ending.	Machine milk.				Hand milk.			
	No. of analyses.	Number of germs in cubic centimetre of morning's milk.	No. of analyses.	Number of germs in cubic centimetre of evening's milk.	No. of analyses.	Number of germs in cubic centimetres of morning's milk.	No. of analyses.	Number of germs in cubic centimetre of evening's milk.
April 10	4	71,124	4	89,204	4	2,560	.....	.....
" 17	20	127,978	12	180,480	5	2,736	.....	.....
" 24	20	141,420	12	176,310	4	9,576	3	8,520
May 1	15	243,327	11	395,726	12	23,829	9	17,637
" 8	18	198,000	6	170,240	7	63,422	4	12,513
" 15	10	105,814	4	112,320	6	2,700	.....	.....
" 22	9	84,012	17	76,658	7	13,472	.....	.....
" 29	18	99,000	8	119,295	6	7,626	.....	.....
June 5	5	131,250	.....	.....	6	3,330	.....	.....
" 12	9	163,602	.....	.....	6	3,520	.....	
" 19	6	114,538	.....	.....	4	4,220	.....	All grass-fed
" 26	5	121,075	.....	.....	2	645	.....	after May
July 3	6	137,213	.....	.....	.....	.....	.....	the 29th.
August 7	4	189,833	.....	.....	5	10,124	.....	
" 14	6	146,767	.....	.....	4	906	.....	
" 21	6	190,830	.....	.....	.....	.....	.....	.....
Total	161	2,265,533	74	1,320,269	78	148,666	16	38,670
Average	.....	141,595	.....	165,033	.....	10,619	.....	12,890

Let us consider next the kinds of germs present in the milk. A considerable variety was found in the machine milk, over 25 species being separated by the usual bacteriological methods, and all grown in pure culture in sterilized milk. Their behaviour in this medium was as follows :

7 curdled the milk to a solid curd, with little or no whey separating from it.

7 curdled the milk with much whey separating, and finally digested all the curd to a whey-like fluid.

2 coloured the milk without further change.

7 made no apparent change.

3 changed the milk to a watery-like fluid, without coagulation of the casein.

12 of the above liquefied gelatine—a process nearly allied to putrefaction, and 14 were found to be non-liquefiers.

The germs in the hand-milk were generally speaking, of the same kinds as were found in the machine milk, but in the machine milk the putrefactive species (those that liquefy gelatine) were very much more numerous and varied.

Effect of the Germs Isolated from Machine Milk on the Flavor and other Qualities of Butter. By F. C. Harrison and M. N. Ross.

The germs isolated from the milk by the usual bacteriological methods were transferred to agarjelly, and when sufficient growth had developed a loopful was transferred to 100 cubic centimetres (about three and one-half ounces) of sterilized, germ-free milk. Another portion of the growth was placed in thirty-five cubic centimetres of sterilized milk, in order to study the changes that might occur in the milk after prolonged growth of the germ in it. The single species of microbe in the 100 cubic centimetres of sterilized milk (called a pure culture) was used as a starter and kept for twenty-four hours at a temperature ranging between 20-25° C. (68-77° F.), and at the end of the twenty-four hours this starter was added to one litre (about thirty-five ounces) of cream which had been previously pasteurized at 158° F. for twenty minutes on two successive days. In a few cases the starter was kept for a longer period than twenty-four hours, and in these cases the results were generally more pronounced.

The cream was ripened at a temperature between 20-25° C. (68-77° F.). The ripening continued for twenty to twenty-four hours, and the cream was then cooled and churned in a small tin, worked in an oil-test churn. This method was adverse to the production of a butter with a fine texture, as the rather rapid movement of the churn and the thinness of the tin in a warm atmosphere caused the cream to rise several degrees in temperature during the churning.

No control cream was used, because several different germs were put into each lot of cream, and the relative results were practically correct. A bacteriological examination of each lot of cream was made after pasteurization and before adding the starter, and this analysis revealed the fact that two spore-forming germs which were present on all occasions except two, but in such very small numbers that their presence did not interfere materially with the results, and from experimental churnings of cream made with starters seeded with these spore-forming germs, it was found that they made no appreciable difference in the results. It is also evident that the experimental germs introduced into the cream with the starter would be in such overwhelming majority that they would overcome completely the growth of the few germs present in the pasteurized cream.

In several cases, pasteurized cream kept for twenty-four hours without showing any increase of acid; one sample kept for seven days before becoming ripe enough to churn (six per cent. of acid.)

All the butter was washed twice, and this, no doubt, caused a loss of flavour in some samples which were adjudged "not bad" or "flavorless;" but it was desirabl to wash it, as part of the experiment was to ascertain the keeping qualities of the butter

One-half ounce of salt was added to the pound, as in the opinion of the judges the flavor of the butter was more definitely brought out by the use of at least a little salt. The butter was judged by Mr. W. J. Palmer, of the Kensington Dairy, Toronto, and Professor Dean, and a portion by T. C. Rogers, the College butter-maker, first when fresh and again when from three to four weeks old. The butter during this time was stored in the dairy refrigerator.

The judges' opinions differ somewhat, and of course it is difficult to eliminate altogether the personal equation, but they agree as to whether the flavor and aroma were desirable or not. Each judge also stated that every sample had a distinctly different flavor, not two lots having been described as alike by any judge.

Before discussing further results, it might be well, for the sake of clearness and explicitness, to explain the meaning we attach to the terms *acid*, *flavor* and *aroma*.

By *acid* we mean the decomposition of milk sugar into lactic acid, giving rise to what is termed the souring of milk. The one species of germ may develop both acid and a pleasant flavor; but the production of the flavor probably comes, not from the decomposition of the milk sugar, but from the decomposition of the fats or albuminoids

present in the cream. Another species of germ may develop acid and a bad flavor; and this is proof that we have two kinds of decomposition taking place.

Flavor in butter is that quality which appeals to the sense of taste. It may be developed, as stated above, by a germ that also produces acid, but a good flavor may also be developed in cream by alkali-producing germs independent of acid production.

Aroma in butter is that quality which appeals to the sense of smell, and is especially noticeable in freshly made butter. It is the most difficult quality to obtain and retain; and it disappears as the butter ages. The fine quality of June butter is due largely to the aroma. Hence we say the aroma is very volatile, and probably is derived from the decomposition of the albuminoids.

Effect of the Germs. The effect of the germs on the butter was quite marked in most cases, and was distinct and characteristic. In grouping them we find that,

4	germs	gave a flavor	which was pronounced	good.
4		"	"	passable.
7		"	"	neutral.
11		"	"	bad.

The "passable" flavour was present in the butter only while fresh; when kept for some time it went "off" in flavor.

The ripening temperature was found to have the greatest influence on the action of the germs; and no doubt different results would have been obtained if the cream had been ripened at other temperatures.

Acid Production. The most important and most noticeable difference was in the production of acid.

Sartori states that the most desirable amount of acid for the production of a good flavour is .6 to .7 per cent.; and his quantity has been found to give the best results in our college dairy. Of the germs tested,

18 gave .6 per cent. and upwards of acid.
7 gave less than 6 per cent of acid.
11 gave a neutral, or alkaline, reaction.

It should be borne in mind that the results apply only to the particular temperature and length of time at which the cream was ripened. Fleischman states that "to obtain ripeness in a longer or shorter time than eighteen to twenty-four hours has been shown to be risky, since under such conditions uniform ripeness can scarcely be expected to take place throughout the entire mass." With regard to this point, it is of interest to note that some cream that had been left for three days without stirring, tested 1.37 per cent. of acid at the bottom and only .67 per cent. at the top.

The amount of acid produced is shown to have a distinct effect on the amount of butter obtained from the cream; germs producing a larger amount of acid than others in the same amount of cream, invariably gave more butter. This fact supports Babcock's theory, that the ripening of the cream dissolves the fibrin present, and so permits the fat globules to collect more easily. When acid is not produced in sufficient quantity a large number of the fat globules are lost in the butter-milk.

Fleischman also remarks that, "If the liquid has not quite gained a sufficient degree of ripeness before churning, the result is that less butter is obtained; and if the degree of ripeness be exceeded, the nature and keeping quality of the butter will be injured."

Several of our experiments seem to indicate that with the same lot of cream, one portion having more acid in it than the other, the one with the greater acidity will churn slightly sooner than the other, but the time does not vary exactly in proportion to the difference of acid.

Flavor and Aroma. In several cases most noticeable differences existed between the flavor and aroma. For instance, the butter ripened with germ No. 9 had a most unpleasant flavor, but whilst fresh had a splendid aroma; that ripened with germ No. 26 also had a good aroma and an unpleasant flavor. Some germs when used singly produced little or no aroma, but when mixed together produced a decidedly pleasant aroma; this was true of germs Nos. 2 and 25. It seems possible that, in such cases, the substances resulting from the action of one germ is acted upon either by another germ or by the products of another germ.

Some of the mixtures furnished good examples of the power possessed by many of the desirable germs of neutralizing and, to some extent, overcoming the actions of others that give poor results; but in some cases the influence of the latter was stronger than that of the former, and in no case was the bad flavour entirely eliminated. A rather remarkable fact occurred in cases in which the cream before churning and the butter-milk had a strong unpleasant smell, which was not transferred to the butter.

The best butter was produced by a mixture of germs obtained from the milk of a neighboring farmer's cow. There were isolated from this milk three germs and a mould; and the latter had the power of coagulating milk in thirty hours. Hueppe's lactic acid germ was found, and the remaining two were acid producers.

Only one germ isolated from the machine milk produced gas in glucose bouillon; but No. 6 produced gas very plentifully in cream. A few germs were obtained which gave no acid reaction, but coagulated the starter. These belonged to the rennet producing class mentioned by Conn and others. The putrefactive germs, which curdled and then digested the precipitated casein, were also present; and, in a few cases, the action of these germs brought about a decided difference in the colour of the butter; for instance, No. 6 invariably produced a light coloured butter.

These experiments have shown that the number of undesirable germs in the "machine" milk far exceeds that of those which are desirable. Taking Conn's results as normal for hand milk and ordinary conditions we notice considerable difference.

Conn found 18 out of 68, or 26 per cent., to have injurious effects upon butter.

Harrison and Ross found 11 out of 26; 42 per cent.

Conn found 10 out of 68 to have beneficial effect; 29 per cent.

Harrison and Ross found 4 out of 26; 15 per cent.

Briefly, the germs isolated from the machine milk were 16 per cent. more injurious than those isolated by Conn (his conditions being taken as normal).

The only practicable method of overcoming these bad effects is by thorough pasteurization of the cream and the addition of a good starter, produced from pasteurized milk to which has been added either good buttermilk from an excellent flavored butter, or, failing this, a culture obtained from some recognized source and which is known to be good. There are now several of these on the market, and there is no doubt that their introduction has been productive of much good.

Tabulated Data of Species.

(Note.—All germs from machine milk unless otherwise specified.)

1. A motile bacillus; liquefies gelatine; curdles milk after four days; subsequently digests the curd. The starter made from it was not uniformly curdled, although shaken at the usual times. The cream was lumpy at the bottom and contained 78 per cent. of acid. The butter had no flavor and was slightly sour.

8. Actively motile bacillus; liquefies gelatine rapidly; gives off a smell of sulphuretted hydrogen; coagulates milk; subsequently digests the curd and coagulates the cream. Cream churned slowly. Butter was off flavor.

5. Actively motile bacillus; liquefies gelatine; turns milk watery whilst a few flakes appear on the surface, and thickens the cream. There was no curdling of cream. Butter was flat and flavorless, with rancid aroma.

(*Continued on page 140.*)

Tabulated data of butter made from cream inoculated

Germ added to sterilized milk to make starter.	Description of starter, the amount in every case being 100 c. c. (about 4 ozs.).	Per cent. of fat in the cream.	Acidity of raw cream.	Number of germs in pasteurized cream.	Range of temperature of cream during ripening.	Time taken in ripening the cream.	Acidity of cream when ripe.	Temperature of cream before churning.	Description of cream before churning.	Time occupied in churning.	Weight of granular butter.	Weight of worked butter.	Temperature of buttermilk.
					Centigrade.	hrs.		Centigrade.			grs.	grs.	Centigrade.
1	Thick sediment..	24	.41	80	18 to 26	24	.78	17	Thin but lumpy at the bottom.	20	310	275	18
8	Very much curdled, whey separated.	24	.33	80	18 to 21	24	.54	18	Cream smelt badly.	30	230	220	20
5	Not curdled, bad smell.	$23\frac{1}{10}$	.52	600	18 to 21	22	.81	17	Very thick	25	335	310	18
2	Unchanged.....	$23\frac{1}{10}$	.60	600	18 to 21	20	.49	17	No smell, no flavor.	35	210	200	19
3	Unchanged	$23\frac{1}{10}$	.54	600	18 to 21	22	.52	16	Cream lumpy...	30	220	205	19
4	Unchanged	$25\frac{2}{10}$	.33	480	20 to 24	24	1.56	16	Cream very thick and sour.	25	295	280	20
6	Unchanged.....	$25\frac{2}{10}$	.33	480	20 to 24	23	.03	16	Cream thin, contains gas bubbles.	25	200	190	20
7	Unchanged.....	$23\frac{4}{10}$	.49	260	20 to 24	22	1.25	17	Cream very thick and acid.	30	340	320	21
10	Unchanged.....	$23\frac{4}{10}$	.51	260	20 to 24	23	.49	21	A little thickened.	40	335	305	21
9	Unchanged.....	$23\frac{4}{10}$	.54	260	20 to 24	23	1.03	15	Very thick and acid, peculiar smell.	5	345	325	20
11	Unchanged.....	....	.41	400	20 to 35	22	.41	12	Bad smell, especially whilst churning.	50	225	215	18
12	Putrid smell.....	....	.26	400	19 to 26	20	.31	12	Bad smell	65	345	340	15
13	Unchanged	....	.26	400	19 to 26	22	.49	7	Exceedingly thick and lumpy.	65	265	250	13
14	Unchanged.....	....	.27	....	21 to 28	22	.60	12	Very thick and curdled.	40	265	230	15
15	Unchanged.....	....	.27	....	21 to 28	23	.91	13	So thick water had to be added before churning.	30	365	350	15
16	Very curdled, whey not separated.	....	.30	....	25 to 28	24	.39	15	No change	70	250	230	19
17	Unchanged... ..	....	.31	....	22 to 28	24	.55	15	.....	40	325	265	20
18	Curdled	....	.51	....	22 to 28	24	1.03	12	....	55	295	280	19
5 & 10	Unchanged.....	....	.51	....	22 to 28	24	.35	12	....	60	290	260	15
19	Unchanged...	....	.20	....	21 to 25	24	.49	12	Very sweet, like sugar.	30	375	350	15
19	Very bad smell, unchanged.	...	.22	20	15 to 21	48	.72	12	Coagulated, whey separated, bad smell.	80	210	190	20
2 & 24	Coagulated, 48 hours old.	....	.23	....	18 to 25	22	1.10	14	Thickened	20	340	300	16
29	Not coagulated ..	....	.23	....	18 to 25	20	.75	14	Thick, lumpy...	65	255	225	18
11, 24, & 2	Coagulated, 48 hours old.	....	.23	....	18 to 25	22	1.40	14	Thick, good condition.	30	270	250	16

with germs, isolated from machine-drawn milk.

Mr. T. C. Rogers' score.			Mr. W. J. Palmer's score.		Prof. Dean's score. Old butter.		
Flavor. Max. 45.	Color. Max. 15.	General description.	Fresh.	Four weeks old.	Flavor. Max. 45.	Color. Max. 15.	General description.
35	14	Not good	No butter flavor, slightly sour.	Rancid	....	....	All very rotten.
41	14	Mild	Off in flavor	Rancid, bad	....	....	All very rotten.
41	13	Poor flavor	Flat and flavorless, rancid aroma.	Cheesy	....	....	All very rotten.
32	14	....	Rich buttery flavor, mild.	....	....	....	All very rotten.
....	....	Butter soft	Quite cheesy	....	....	....	All very rotten.
32	12	Bread flavor	Peculiar medicinal flavor, aroma like choke cherries.	Rotten	....	....	All very rotten.
41	13	Mild, but sweet	Sweet but lacks flavor	....	....	....	All very rotten.
30	13	Undesirable	Slightly cheesy, strong bad smell.	Rancid, sour	....	....	All very rotten.
30	14	Not good	Slightly rancid	Rancid	....	....	All very rotten.
35	14	Bad flavor	Rancid and bitter, aroma good.	Rancid	....	....	All very rotten.
20	14	4 weeks old, rancid	Full butter flavor, good	....	36	11	Cheesy.
20	10	....	Very flat, no flavor	Flat, aged, kept very well.	38	13	Fair.
22	10	Cheesy, rancid	Off, rank	Cheesy, bad	38	12	Cheesy.
....	....	....	Rancid	Rank	35	10	Cheesy.
....	....	....	Off, very tasteless	Stinks	35	12	Tallowy.
....	....	....	Off, tasteless, aged	Cheesy	25	12	Very rotten.
35	....	4 weeks, no good	Dish-rag flavor	Bad, like Stilton cheese.	....	....	....
15	12	4 weeks, sour	Fine and mild but lacks flavor.	....	38	13	Poor.
....	....	....	No flavor, perfectly flat	....	37	12	Cheesy.
38	15	Not very aged	Flavor like roots, bad smell.	Bad	30	13	Very bad.
....	....	....	Flavor bad	....	35	12	No flavor.
....	....	....	Good but mild, no aroma.	....	35	11	Very cheesy.
....	....	....	Aroma good, poor flavor.	....	20	13	....
....	....	....	Good mild flavor, no aroma.	....	36	11	Cheesy.

Tabulated data of butter made from cream inoculated

Germ added to sterilized milk to make starter.	Description of starter, the amount in every case being 100 c. c. (about 4 ozs.).	Per cent. of fat in the cream.	Acidity of raw cream.	Number of germs in pasteurized cream.	Range of temperature of cream during ripening.	Time taken in ripening the cream.	Acidity of cream when ripe.	Temperature of cream before churning.	Description of cream before churning.	Time occupied in churning.	Weight of granular butter.	Weight of worked butter.	Temperature of buttermilk.
					Centigrade.	hrs		Centigrade.			grs.	grs.	Centigrade.
14	Unchanged in 12 hours.	....	.27	....	20 to 24	24	.30	15	Unchanged, smells of sulphuretted hydrogen.	40	275	260	17
15	Unchanged in 12 hours.	...	.27	....	20 to 24	24	.34	15	... .	35	240	225	18
3	Unchanged in 12 hours.	....	.27	....	20 to 24	24	.27	14	.....	30	230	225	17
4	Unchanged in 12 hours.	...	.27	....	20 to 28	20	.32	14	Cream too thick to run.	45	280	265	17
25	Very coagulated.	....	.27	....	20 to 28	20	1.17	14	Cream thickened	30	335	295	16
6	Unchanged.....	....	.27	....	20 to 28	20	.49	14	Bubbles of gas in cream.	50	300	275	17
26	Unchanged.....	....	.22	....	18 to 25	20	.54	14	Thickened	30	240	215	16
26	Unchanged .. .	....	.20	....	16 to 20	20	1.16	15	Thickened	40	255	175	16
21	Unchanged.....	....	.37	80	26 to 26	20	.45	14	.....	30	190	175	18
22	Unchanged.....	....	.45	80	26 to 26	23	.45	14	....	35	195	165	16
24	Very much coagulated.	....	.37	80	26 to 26	22	1.15	15	Very thick and acid.	30	245	230	18
Starter from dairy.	Pleasant smell ..	...	.45	200	25 to 26	24	1.53	13	Very thick	40	245	215	15
Cream left standing.	No starter used..	....	.45	200	25 to 25	20	1.56	14	Very thick	30	250	215	16
6	Unchanged.....	....	.27	180	15 to 27	24	.27	16	.....	40	155	140	19
16	Casein partly digested.	....	.27	180	13 to 27	22	.29	16	Curdled	30	155	135	19
21	Unchanged.....	....	.28	10	15 to 21	48	.36	14	Bad smell in churn.	50	235	175	16
2 & 25	Coagulated	....	.28	10	15 to 21	48	.47	14	Very thick	35	285	260	16
20	Unchanged.....	....	.20	....	21 to 25	24	.49	10	Very thin	55	365	340	15
21	Unchanged.....	....	.32	80	24 to 25	24	.36	12	Sweet, smells like raw meat.	25	280	260	15
6	Unchanged.....	....	.32	80	25 to 25	24	.67	13	Bad smell	35	325	300	16
8 & 11	Unchanged.... .	...	.13	140	23 to 25	22	.29	12	Unchanged....	30	310	280	14
9 & 10	Bad smell	. ..	.13	140	23 to 25	24	.29	12	Objectionable smell.	30	330	320	15
21	Unchanged.....	....	.34	120	25 to 25	23	.40	13	Bad taste, not thickened.	25	325	300	16
23	Coagulated, whey separated.	....	.35	120	25 to 25	20	1.19	13	Very thick and acid.	35	375	340	15
2 & 25	Coagulated	....	.31	140	20 to 25	20	1.06	12	Very thick, rich flavor.	35	375	345	15
2 & 18 & 25	Coagulated	....	.31	140	20 to 25	20	1.12	13	Very thick	25	400	370	15

with germs, isolated from machine-drawn milk.—*Concluded.*

Mr. T. C. Rogers' score.			Mr. W. J. Palmer's score.		Prof. Dean's score. Old butter.		
Flavor. Max. 45.	Color. Max. 15.	General description	Fresh.	Four weeks old.	Flavor. Max. 45.	Color. Max. 15.	General description.
....	....	.....	Off, woody	.....	42	13	Fair butter flavor.
....	....	.....	Cowy	.....	32	13	Bad.
....	....	.....	Fine clean flavor.....	.....	35	13	Disagreeable.
....	....	.....	Full pronounced flavor..	.....	35	13	Bad.
....	....	.....	Flat and tallowy, no aroma	.....	40	13	Passable, not good.
....	....	.....	Fine full flavor	.....	20	10	Old cheese aroma, sweet flavor.
....	....	.....	Aroma good, flavor unpleasant and bad.	.....	40	13	.....
....	....	.....	Cheesy and sour	.....	38	12	Poor.
....	....	.....	Flat, off	Strong buttermilk flavor.	30	10	Rancid.
....	....	.....	Flavor good but mild ...	.....	37	12	Cheesy.
....	....	.....	Flavor and aroma cheesy.	.....	....	....	.....
....	....	.....	Very good flavor, good aroma.	.....	35	11	Fairly good.
....	....	.....	Flavor unpleasant	.....	30	13	Bitter.
....	....	.....	Mild, no aroma	.....	38	14	Fair.
....	....	.....	Flat	Distinctly cheesy.	32	13	Very poor.
....	....	.....	Flat	Cheesy	30	12	Tallowy.
....	....	.....	Fair	.....	.....	...	.....
....	....	.....	Rich but too mild.....	Rancid, acid.....	37	14	Not very bad.
25	13	Starter flavor	Flavor hardly discernible, no aroma.	Fine clear flavor.	32	14	Off.
35	14	Passably good	No aroma, flat	Off, slightly sweet	32	14	Bad.
25	13	Peculiar flavor.....	.....	Cheesy	30	13	Cheesy.
....	....	.....	Bitter, bad	Rancid	10	10	Very rank.
....	....	.....	No flavor	Cheesy	32	14	Bad.
....	....	.....	Mild and pleasant	Old and rancid...	32	13	Rancid.
....	....	.....	Too mild, aroma good...	Rancid, slightly acid.	36	13	Bad.
30	14	Mild	Too mild, aroma good...	.....	30	13	Off.

2. Sluggishly motile bacillus; liquefies gelatine; makes milk watery, and has an alkaline reaction. It produced less butter from same amount of cream than No. 5. Butter was of better quality and flavor.

3. Non-motile bacillus; liquefies gelatine; gives alkaline reaction but does not affect milk. Gave less butter than No. 5, and of a cheesy flavor.

6. Non-motile torula (a kind of yeast); does not liquefy gelatine; gives alkaline reaction, and produces gas in cream, but does not change milk. Loss of butter very marked (compare with No. 4, of same lot of cream). Butter had a yeasty flavor.

In the first experiment, an alkaline reaction was given; in the second, an acid; in the third, a neutral; in the fourth, all acid. The difference was evidently caused by the effect of the temperature at which the cream was ripened. At the lower temperature, no acid was formed; at the higher temperature, acid was formed. In each experiment, this germ produced less butter than other germs with the same cream. The butter had pleasant flavor when fresh, but a yeasty taste when aged.

4. Small motile bacillus; does not liquefy gelatine; does not change milk, but produces a yellow growth on the surface; gives the butter a very peculiar "medicinal" flavor and an aroma like choke-cherries.

7. Small non-motile bacillus; does not liquefy gelatine; gives a cheesy flavor and a bad aroma to butter.

10. Non-motile coccus; does not liquefy gelatine; does not change milk. Butter made from this germ seemed always to be of a much lighter color than the other lots of butter,—in one case it was almost white.

9. Large bacillus, actively motile; liquefies gelatine; changes milk to a watery fluid. The flavor of butter from this was distinctly rancid when a few days old. The aroma was uncommonly good, and from some unaccountable circumstance, in the first experiment with this germ, the cream churned in five minutes.

12. A non-motile bacillus; liquefies gelatine; produces no effect on milk, but gives a very bad smell to cream. The butter was flavorless.

11. An actively motile bacillus; does not liquefy gelatine; does not change milk; does not effect acidity of cream, but gives it a bad smell. The flavor of the butter was good.

13. A non-motile bacillus; liquefies gelatine; curdles and digests the casein of the milk. Butter had a rank flavor.

14. A non-motile bacillus; does not liquefy gelatine; does not change milk. The butter had a rancid flavor.

15. A non-motile bacillus; liquefies gelatine after eight or nine days; produces no acid, but causes the cream to become very thick. Butter had no noticeable flavor.

16. A non-motile coccus; liquefies gelatine; precipitates the casein of milk, leaving a clear whey. Butter was tasteless.

17. A non-motile bacillus; does not liquefy gelatine; gives a bad smell to milk. Butter had a bad flavor.

18. A motile bacillus; liquefies gelatine; curdles milk; digests the casein and gives off a putrid smell. The butter lacked flavor.

19. A motile bacillus; when grown on potatoes gives a strong mousey smell; does not liquify gelatine. Butter had a bad aroma and a root-like flavor.

20. A motile bacillus; liquefies gelatine; curdles and digests the casein of milk. Butter had a mild flavor.

21. A motile bacillus; a non-liquefier; curdles milk in four days. Butter was flavorless.

22. A motile coccus; found in pasteurized cream; a non-liquefier. The casein was gradually digested without coagulation. The butter was mild both in flavor and aroma.

23. A non-motile coccus; a non-liquefier; coagulates milk. Butter had a mild, pleasant flavor.

24. A mould—a species of Oidium—growing freely on the surface of the milk. This mould corresponds to the description of Oidium lactis, with the exception that the mould found in this case coagulates the milk and forms much acid. Butter was "cheesy" in aroma and flavor.

25. A non-motile bacillus (*Bacillus acidi latici* of *Hueppe*); coagulates milk. Butter had no aroma and was "flat" in taste.

Machine-Drawn Milk for Cheese-Making.

No bacteriological analyses were made of cheese from machine milk, consequently I cannot say for certain that the germs found in the milk were also in the cheese; but the evidence from a practical standpoint strongly pointed that way.

Two small cheeses were made from machine milk by Mr. Stratton at the college dairy on July the 26th, 1897. One vat contained aerated milk and the other contained unaerated milk. No starter was added; the curd was gassy; there was great loss of fat at salting (three pounds of fat lost in drippings); and the curd had a very bad flavor.

Both the cheeses were judged a month later by Mr. G. J. Brill, when the flavor was scored 20 and 26 respectively out of 35.

Summary and Conclusions *re* Machine-Drawn Milk *versus* Hand Milk.

Bacteriological experiments and practical observations conclusively prove that milk drawn by the Thistle milking machine contains a considerably greater number of germs than ordinary hand milk.

Machine milk sours much more quickly than hand milk, there being 10 to 30 hours difference in favor of the latter.

There are large numbers of undesirable bacteria (putrefactive germs, etc.) in machine milk. These deleterious forms destroy the keeping quality of the milk, spoil the flavor of the butter made therefrom, cause great loss of fat in the making of cheese, and produce bad flavor in the cheese.

The college butter maker, Mr. Rogers, was unable to make first-class butter from the milk; and Harrison and Ross's experiments show a large number of germs which produce bad flavor in butter.

As stated above, the infection of the milk arises from:

1. Germs on the hairy portion of the udder, drawn into the pail by the pulsation of the teat-cups, etc.

2. Inability to cleanse thoroughly the cups and rubber connections.

3. The occasional falling of cups upon the stable floor, and constant contamination from material full of germ life.

The infection under 1 and 3 may, we think, be largely prevented by due care on the part of milkers; and it is possible that the makers of the machine will devise some means of overcoming the difficulty about cleaning and disinfecting the udder cups and tubes.

Bad Flavor in Cheese caused by Undesirable Bacteria in Water used in Factory.

During the past two years, I have made a large number of analyses of Canadian Cheddar cheese, and one of the samples sent this year by Mr. Publow, instructor in cheese-making for Eastern Ontario, had very bad flavor. Mr. Publow writing to me on August the 1st, 1897, says: "I send you by this mail a sample of cheese from the Ashton Union factory. I find all their cheese has a bad flavor, and in testing the milk it all appeared to be of very good flavor. The cheese-maker is a good maker, and has his factory in first-class condition. Every thing is very clean, but the water he is using stinks, and I think is the cause of the bad flavor. I am having them send you a bottle of the water."

Later, I received more cheese together with Mr. Publow's report on the factory, which reads as follows:

"Factory visited on 31st July, 1897. The condition of the factory, milk vats, presses, sinks, and utensils, was clean and satisfactory. The making room's appearance

and condition were clean and tidy. The curing room's appearance and condition were clean and tidy. The drainage good. General appearance first class."

Report on the Cheese. "Number of cheese made each day, 10; flavor, not clean, off flavor; body, close and firm; texture, fine; color, bright and uniform; appearance and finish, neat, well finished. Remarks and recommendations: The cheese are all well made and have a fine appearance, but off flavor."

The water from the Ashton Union factory was received in a large Winchester bottle, in good condition, but it was not packed in ice, and as a considerable interval had elapsed between the collection of the sample and its examination, the number of bacteria present when collected must have undergone extensive multiplication; for example, Kruger* found that the bacteria in samples of water examined by him and kept for 20 hours ar 52° F. increased 5.3 times. This fact may account in part for the very large number of germs present in the sample sent from the Ashton factory, viz., an average of 271,000 per cubic centimetre.

There were five different species of germs present; each was grown in pure culture and sterilized milk was inoculated with each species.

The chemical analysis of the water showed that it was below second class and consequently should be regarded as suspicious.

The bacteriological analysis of the cheese was as follows:

Average total number of germs, 11,404,800 per gram (1/29 of an ounce); species present. 4; per centage of lactic acid germ present, 94; per centage of other germs present, 6.

The germs isolated from the milk and cheese were compared, and two of the species found in the water were discovered to be identical with two of the species in the cheese. One kind was, however, in such small numbers in the cheese that its presence was disregarded altogether; and the biological characters of the remaining germ were carefully studied, in order to be sure that the species found in the water and that found in the cheese were identical.

The biological characteristics of the germ were as follows:

Occurrence: In water and cheese from Ashton Union factory.

General character: Shape and arrangement, a bacillus, with rounded ends, occurs singly and in long threads; size, about four times as long as wide; mobility, very slowly motile; spore formation, none observed; relation to temperature, grows best at about 30° Centigrade, at 15° grows very slowly; relation to air, a facultative anaërobe, grows in hydrogen gas; relation to gelatin, does not liquefy gelatin; color, a dirty ochreous growth on potatoes; stain, stains readily with all the analine stains.

Gelatin: Stick culture, growth all along the track of the needle, does not spread on the surface of the gelatin, white growth not at all characteristic; plate culture, colony about the size of a large pin head, white and perfectly round, edge of the colony sharp and well defined with $\frac{2}{3}$ objective, appears slightly granular and brown in color, edges entire.

Agar: Streak culture, moist, round, semi-transparent colonies appear on the surface of agar, these fuse together at the centre of the needle track, and appear as a moist, flat and semi-transparent growth. The growth is not sticky, but very moist.

Milk: Coagulated into a soft mushy curd, is rendered slightly acid, and gives off a bad odor; no whey separates.

Potato: A waxy, pale, ochreous color, abundant growth.

Smith tube: A little gas is produced in glucose bouillon, growth occurs in both arms of the tube, and a fine sediment settles at the bottom, leaving the media quite clear.

Bouillon: Bouillon slightly turbid, sediment present.

A starter made from a culture of this germ in milk (pasteurized for twenty minutes on two consecutive days) was used in a vat of milk for making cheese at the College

* Kruger-Leitschrift für Hygieni, vol. VII., page 90.

dairy on August the 13th. The following are the particulars of making, as reported by Mr. Stratton, the College cheesemaker :

Pounds milk	200.
Condition of milk	Normal, good.
Per cent. of fat in milk	3.2.
Amount coloring used	2 drachms.
Rennet test for ripeness	22 seconds.
Temperature set	88° F.—2° higher than usual.
Time set	11.55 a.m.
Amount of rennet used	3½ oz. per 1,000 lbs. of milk.
Time cut	12.28 p.m.
Minutes in curdling	33 minutes.
Temperature for cooking	98°.
Hot iron test when dipped	No acid ; acid in whey, .198%.
Time dipped	3 p.m.
Time from setting to dipping	3 hours 5 minutes.
Per cent. fat in whey	·35%.
Hot iron test when milled	No acid (per cent. acid, .333).
Time milled	5.10 p.m.
Time salted	6 a.m., August the 14th.
Hours from dipping to salting	15 hours.
Amount of salt used	2½ lbs. per 100 lbs. curd.
Temperature put in press	82° F.
Weight of green cheese	18.25 lbs.
Weight of cured cheese	17.0 lbs.

Milk was about three hours ripening from time of adding starter. The flavour was rank ; curd the same. Have had lots of curd with more gas, but this one was so harsh and stiff at 8.30 p.m. that I decided to leave it over night before salting. Left two pails of hot water in vat and covered well.

In the morning, water was at 96°, curd 83° ; more gassy than on the night before. Milled at 5.15 a.m. and aired until salted. It was so dry that no drippings would run from it after milling a second time. Squeezed enough from curd cloth for an alkaline test, which gave .765 per cent. of acid.

The cheese was allowed to ripen for two weeks and was then analyzed ; and the germ previously found in the cheese and water from the Ashton Union Factory was discovered in large numbers. The cheese had a bad flavour and was pronounced poor by two expert judges, Mr. T. C. Bell, of Tavistock, and Mr. G. J. Brill, of Guelph. Three and a-half months later the cheese was re-examined, and still found off in flavour ; and from a sample recently taken, I have again succeeded in isolating the original germ.

The results of the analysis of the water, etc., were briefly communicated to Mr. Publow, who condemned the well. The cheesemaker at once stopped using this water, and thereafter obtained what he required from another well.

In a letter dated August 30th, 1897, Mr. Publow writes : "The cheese is all right since they stopped using the water."

This completes the chain of evidence ; and from it cheesemakers and others will see the importance of using pure water.

The germs may have got into the cheese in two ways :—

1. From the setting of the vats. The rennet was, as usual, mixed with half-a-pailful or more of water and stirred into the milk.

2. Thorough infection of the vats by the contaminated water. Perhaps germs from the water used in washing found lodgment in the crevices and cracks of the vats, or even on the surface ; and, the momentary application of hot water or steam not being sufficient to destroy their life, they multiplied very rapidly when the milk was added. Further, it may be that the floors, etc., washed with the contaminated water dried, and microbes rising in the currents of air were carried about and brought into contact with the milk in the vats ; for germs are so small that very many find lodgment on the dust particles that we see when sunlight strikes through a semi-darkened room.

In this case, however, the infection was probably due chiefly to setting of the vats.

Another factor that should be mentioned was the high average temperature of the curing room, which was 72° F. This temperature gave more favorable conditions to the growth of the noxious germ, and less favorable conditions for the growth of those germs whose presence in cheese is necessary for the production of the finest flavour and quality. A temperature of 65° F. is more favorable to the latter.

Summary. The cheese from the Ashton Union Factory was said to be "off flavor" and "not clean," an abnormal condition arising from the presence in the cheese of a noxious germ. This harmful germ was found in the well water, and the water was used in setting the vats, thus innoculating the milk with the germ. In other words, the water acted as a starter.

Currents of air or dust arising from dry surfaces which were washed with the contaminated water may have contributed something towards the seeding of the cheese with the undesirable germ, but it is likely that the trouble arose chiefly from the use of the water in washing the vats and in setting.

The high average temperature of the curing room (72° F.) favoured the growth of the undesirable germ in the cheese.

A change in the water supply caused an immediate difference in the flavour of the cheese. Since the change there has been no trouble.

Hence we may repeat what has often been said, viz, that factory men should pay very close attention to the water supply in their factories, to see that it is clear, pure and good. Bad smelling water should never be used for setting vats. In all doubtful cases, the water should be boiled and then cooled to the required temperature.

Tuberculin.

On account of the new quarantine regulations between Canada and the United States, animals entering the latter country have to pass the tuberculin test. Hence, the Minister of Agriculture for Ontario decided that a supply of tuberculin for the Province should be manufactured by and sent out from this laboratory.

On the 7th of May of this year the first lot of tuberculin was sent out. At first the demand was small; but on the publication of a special bulletin by the Department of Agriculture on Tuberculosis, at the end of July, in which it is stated that "The tuberculin will be supplied free of cost to any cattle owners who desire it, by making application to the Agricultural College, Guelph; but only in limited quantity and for the sole purpose of testing their own herds, and under such regulations as the Minister may enact," many availed themselves of the opportunity, and up to the end of November we sent out 840 doses, worth $240, at 25 cents a dose, which is the retail price, charged by the Pasteur Vaccine Co, of Chicago.

All the tuberculin manufactured at the College has given good reactions, and the lymph has in all cases been clear and has remained so, even when diluted. I have examined tuberculin from other places; and in some cases, after adding 1 per cent. of carbolic acid to the concentrated extract, have found the lymph to be quite turbid.

On comparison with the German tuberculin, I have found our own manufacture to be equally good. No complaint has been raised as to its value; in fact, several veterinary surgeons who have used the lymph, have expressed their satisfaction with it. One wrote as follows: "It works well, as well as any I have ever used, and far better than the most of it."

The tuberculin has been sent out in homœpathic phials, holding from 6 to 18 doses of concentrated tuberculin. The phials are sealed, labelled and sent out with the following directions:

Directions for Use. The febrile reaction in tuberculous cattle following the subcutaneous injection of tuberculin, begins from four to ten hours after the injection,

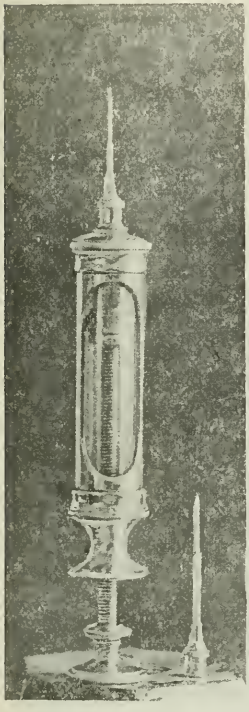
reaches the maximum in twelve to twenty hours after the injection, and returns to normal eighteen to twenty-six hours after the injection.

In conducting the test, the following course is recommended to those who wish to obtain the most accurate results :

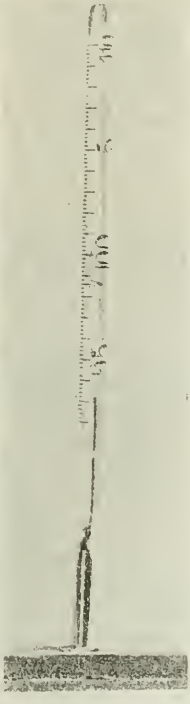
1. Begin to take rectal temperature at 6 a.m. and take it every hour thereafter till midnight.

2. Make the injection at midnight.

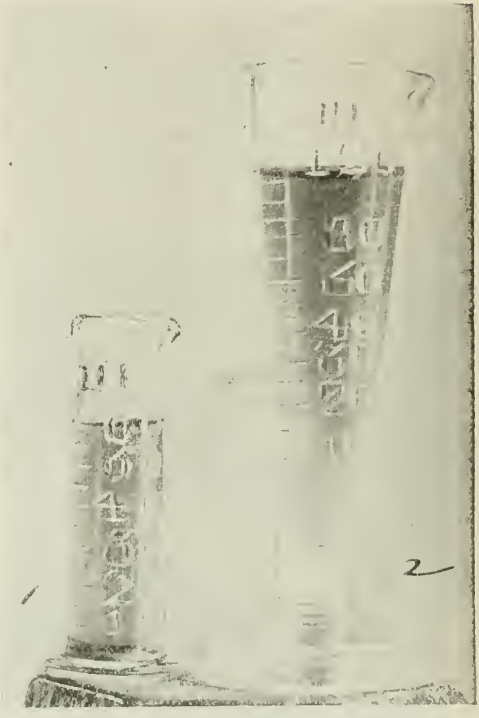
3. Begin to take the temperature next morning at 6 a.m. and continue as on preceding day.



A.—Hypodermic Syringe with needle affixed. The syringe is standing on the piston, which is partially drawn out. To the right is an extra needle.



B.—Clinical Thermometer. The long marks are degrees; the short marks fifths of a degree.



C.—Two graduates, actual size. No. 1 holds 60 minims or drops; No. 2 holds 120 minims or drops.

To those who have large herds to examine, or who are unable to give the time required by the above directions, the following shortened course is recommended :

1. Begin to take the temperature at 8 a.m., and continue every two hours until 10 p.m. (Omitting at 8 p.m., if more convenient.)

2. Make the injection at 10 p.m.

3. Take the temperature next morning at 6 or 8 a.m., and every two hours thereafter until 6 or 8 p.m.

The amount to be injected into each adult animal is $\frac{1}{2}$ cubic centimetre (about 8 minims) of the tuberculin, diluted to 5 cubic centimetres (about 85 minims), with one per cent. carbolic acid. For yearlings and two-year olds, two thirds of above dose; and for bulls and very large animals, one third more than the usual dose.

The injection is made beneath the skin of the neck or shoulder; and in healthy animals, it is rarely followed by any constitutional or local disturbance, beyond, in some cases, a very slight rise in temperature. In diseased animals it is followed by a rise in temperature; in some cases, by trembling or uneasiness and fits of shivering. In diseased cows, there is sometimes a decrease in the secretion of milk or impaired appetite, and, rarely, a tendency in pregnant animals to abort.

A rise in temperature, on the day following the injection, of two or more degrees Fahrenheit above the maximum observed on the previous day, is regarded as an indication of tuberculosis. For any considerable rise less than this, a repetition of the injection after two or three weeks is desirable.

The tuberculin test is *not infallible*. In rare cases, the temperature may rise in the absence of any disease, or it may fail to rise when tuberculosis is present, but in the latter case diagnosis may often be made by clinical symptoms.

It is desirable to take note of the time of feeding and watering. During the test, animals should not be turned out, but fed and watered in the stable.

D.—How and where to inject the tuberculin.

Syringes should be *thoroughly sterilized* with five per cent. solution of carbolic acid immediately before use, and also the seat of injection with the same solution.

Accompanying these directions, is a schedule for recording the results of the test—one side of the schedule bearing the following headings:

No. of animal; breed; age; weight; amount injected; date and time of injection; temperature before injection (8, 10 a.m., 12 n, 2, 6, 10 p.m., 12 m; temperatures after injection (6, 7, 8, 9, 10, 11 a m., 12 n., 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 p m, 12 m.; local lesion;—with forty blank lines (sufficient for recording the results from forty head of cattle), while on the other side is printed a form with the following headings:

No. of animal; retropharyngeal glands; mesenteric glands; portal glands; liver; peritoneum; uterus; lungs; bronchial glands; posterior mediastinal glands; udder; pleura; glands of muscles; remarks; local congestion;—for use in those cases in which the animals are slaughtered.

A letter is also sent asking for an acknowledgment of the receipt of the tuberculin and stating the conditions on which it is sent free.

Applications are coming in very fast, and the prospects are that, as its use becomes better known, the demand will proportionately increase. Hence my request for another incubator.

We intend at an early date to send our tuberculin out either concentrated or diluted; and those applying should state whether they require the "concentrated," which possesses good keeping qualities, or the "diluted," which does not keep so well, but is ready for immediate use.

For full directions (including a description of the instruments used; where they can be obtained and their price; how to inject the tuberculin; directions for taking the temperature; reaction, etc., etc.) see special bulletin on "Tuberculosis in Cattle," published in July, 1897, by the Department of Agriculture, Toronto.

The following table is a summarized report of the results of the test sent in by those who have used our tuberculin:

Breed.	Number of healthy animals.	Number of diseased animals.
Shorthorn, pure bred	42	6
Shorthorn, grade	132	21
Jersey, pure bred	51	24
Jersey, grade	58	10
Ayrshire, pure bred	14	..
Ayrshire, grade	7	32
Holstein, pure bred	3	1
Holstein, grade	6	..
Hereford, pure bred	14	1
Sussex, pure bred	2	..
Common grade	173	65
Total	502	160

The bad record under some of the above heads, is due, not to a general prevalence of the disease among animals of that breed, but to certain herds which were very seriously infected.

Milk from Tuberculous Cows.

Carmichael, in 1810, wrote in an "Essay on the Nature of Scrofula, with Evidence of its Origin from Disorder of the Digestive Organs," that infants at the time of weaning are, from the change of diet, particularly subject to bowel complaints, too often followed by disease of the mesenteric and lymphatic glands.

Caspar, in 1822, also suggested the possibility of the transmission of the disease to man by means of milk from tuberculous animals. He says "that La Billardiere declares that the majority of the milch cows of Paris perish from nodular consumption, and that

their milk contains seven time more of phosphate of lime than common. Is it possible that there is a connection between this phenomenon and the many tuberculous diseases among the children of Paris? In the hospitals for foundlings and children the effects of scrofula can be seen in astonishing numbers."

In 1846, Klencke called attention to the fact that some cows' milk contained poison which produced scrofula in children, and asserted that there was a connection between the milk of scrofulous or tuberculous cows and the development of scrofula in bottle fed children. He also demonstrated that the scrofulous lesions which sometimes develop in the cow are the same as those found in the human subject.

Later investigators also pointed out the danger of tuberculous milk. Johne reports a case in which a post mortem examination of a cow revealed extensive tubercular deposits. The milk of this cow, on account of its supposed good condition, had been selected by the farm steward for his inrant son ; but the boy, not being well was examined by his physician and reported as suffering from "emaciation and pulmonary catarrh" ; and a short time afterwards he died of tuberculosis. There was no hereditary predisposition, and the other children in the family were perfectly healthy.

Hermsdorf, Leonhard, Demme, Sonntag, Meyerhoff, Stang, Schonger, and Uffelmann report other cases, which go to show the danger of using milk from tuberculous animals.

So, from the results of the investigations mentioned, and many others, it is evident that the milk of tuberculous cows is highly dangerous, but there are still some doubts as to the infectiousness of the milk of diseased cows when the udder is not directly affected by the disease,—that is, when there are no tubercular deposits in the udder.

Bang, Ernst, Woodhead, Bollinger and others, demonstrated the presence of the tuberculosis germ in milk of animals in which the udder was not diseased ; but Martin and Nocard found that the milk was infected only when the disease was in the udder ieself. Theobald Smith, Ernst, Bang, May, Stein, and Hirschberger, on the contrary, have found that milk from tuberculous cows, even when not suffering irom disease of the udder, contained the bacillus tuberculosis. I shall state briefly the results of a few experiments which were made during the past year.

Case 1.—Large grade cow—tested with tuberculin. Highest normal temperature 106°F. Amount tuberculin used, $\frac{1}{2}$ C. C. Highest temperature after injection, 105°F. This animal, therefore gave no reaction ; but, because of clinical symptoms, she was condemned and killed. The post mortem revealed general infection with tuberculosis. The udder appeared normal, and the tissue was found to be normal. Portions were taken, imbedded and sectioned, but the bacillus tuberculosis was not found.

Previous to the slaughter of the animal, a sample of milk from each quarter of the udder was centrifuged and two cubic centimetres (thirty-two drops) inoculated subcutaneously into each of two guinea pigs. These pigs died in eight and nine weeks afterwards with general tuberculosis.

The results of this experiment, therefore, show that the milk of this cow, though her udder was not affected, was infectious and contained the bacillus tuberculosis.

Case 2. Jersey, pure bred, tested with tuberculin : Highest normal temperature, 102° F. Quantity of tuberculin used, $\frac{1}{3}$ c c. Highest temperature after injection 104.6° F. Reaction, 2.6°. Clinical examination did not reveal any lesions of the udder. Milk taken from each quarter of the udder was centrifuged and injected into each of two guinea pigs. The pigs were killed ten weeks after, and were found to have tuberculosis. This cow was not killed, and as she was not on the college farm I am unable to say what became of her.

The evidence in this case is not quite so positive as in case Case 1, inasmuch as the amount of disease present was not known, and the udder was not dissected or examind microscopically. The veterinary surgeon, however, reported that the cow shewed no external evidences of any tuberculous lesions of the udder.

The result shows that the milk of this cow was infective and contained the bacillus tuberculosis.

Case 3. Jersey cow, two year's old, tested with tuberculin: Highest normal temperature, 102.6° F. Quantity of tuberculin used, $\frac{1}{3}$ c.c. Highest temperature after injection, 105.2° F. Reaction, 2.6°. No evidence of any lesion of the udder. The cow was not killed, but 2 c. c. of her milk was centrifuged and inoculated into a guinea pig. The pig was killed at the end of ten weeks and the organs, etc., were found to be perfectly healthy.

The result of this experiment fails to show that the milk of this cow was infectious.

In these cases we note that, clinically, there was no evidence of lesions of the udder, and the one examined microscopically gave negative results. The one examined was suffering from general tuberculosis; but the conditions of the other two were unknown, except in so far as the tuberculin test indicated disease, and the milk was infectious in two out of three cases. It may be urged that the udder was diseased in Case 1, and that normal portions happened to be selected for microscopical examinations; but in reply I may say great care was taken in the examination of the udder; several small pieces were taken from different parts, and the germ was not found anywhere in the tissues.

It would no doubt have been better to have fed the milk to guinea pigs; but as the owners at once disposed of the cattle it was impossible to get a supply long enough to conduct experiments in this way.

Library.

The library is growing slowly, but as the appropriation granted barely enables us to keep pace with the ever increasing number of periodicals and books, no money is left to expend on complete sets of periodic literature.

In scientific subjects especially the reader meets with many references which he wishes to verify; and, on enquiry at the library, he finds that we do not possess the books referred to. Again, an investigator who decides to undertake work on a certain subject, cannot tell whether the experiment or experiments which he wishes to perform have already been made or not unless he has good library facilities.

In certain new departments of the institution this lack of contemporary literature is a crying want; and I trust that "the powers that be" will endeavor to remedy this lack, so far as may be possible. Complete sets of the *Journal of the Royal Agricultural Society*, *Journal of the Highland Agricultural Society*, and the *Journal of the Bath and West of England Agricultural Society* have been acquired as a first step towards obtaining the best periodic literature in agriculture. We should like very much to extend this list and obtain complete sets of all books and periodicals on the subjects covered by our extensive course of study.

In addition to the following, we would also record our appreciation of all other exchanges, notably those from the United States Department of Agriculture, the various State Experiment stations, and the publications of many of the Departments of Agriculture throughout the British colonies.

Religious papers: Presbyterian Review, Westminster, Congregationalist, Christian Guardian, Evangelical Churchman, Northern Messenger, Canadian Baptist, Choir Leader.

Weeklies: The Weekly Times (Melbourne, Victoria), Montreal Witness, Montreal Star, Acton Free Press, Weekly Sun.

Dairy: American Cheesemaker, Hoard's Dairyman, Chicago Produce, Dairy World (Chicago), Dairy World (London, England), The Dairy, Molkerei-Zeitung, Milch-Zeitung, La Laiterie, Holstein Friesian Register, Creamery Gazette, Jersey Bulletin, Elgin Dairy Report, Jersey Downs.

Agricultural: Swine Breeders' Journal, American Swineherd, Farm Students' Review, Farm Journal, O. A. C. Review, Practical Farmer, Co-operative Farmer and Maritime Dairy, Journal of Agriculture, Farmers' Gazette, American Cultivator, Farmers' Home,

Livestock Report, American Agriculturist, American Horsebreeder, Country Gentleman, Wool Record, Farm Stock and Home, Skordemannen, North Western Agriculturist, Nor' West Farmer, American Sheep Breeder, Farmers' Review, American Fertilizer, Agricultural Gazette (New South Wales), Queensland Agricultural Journal, Connecticut Farmer, Prairie Farmer, Ohio Farmer, Western Rural, Nebraska Farmer, Wisconsin Agriculturist, Dakota Field and Farm, Oregon Agriculturist, Farm, Field and Fireside, Journal of the Jamaica Agricultural Society, Horseman, Canadian Entomologist, Canadian Bee Journal, Bulletin des Seances de la Societe Nationale d' Agriculture de France, Farming, Canadian Horticulturist.

Following are particular books added during the year (to the end of November):

Agriculture	84	Forestry	3
Apiculture	13	Geology	9
Bacteriology	27	Herd books	10
Biology	8	History	1
Biography	1	Horticulture	12
Botany	19	Literature (general)	16
Chemistry	15	Mathematics	1
Dairying	7	Reports	29
Economics	3	Session papers	4
Entomology	7	Travels	3
History	26		

Dictionaries: Two copies, "Standard," and two volumes, French-English.

Volume of Papers, etc., Bound During the Past Year.

Bulletins	61	Journal Pathology	2
Experimental Station Record	6	N. S. W. Gazette	5
Insect Life	4	Agricultural Journals	27
Botanical Gazette	9	Other papers	4
Cent. für Bakteriologie	16		

Total number of volumes added during year 427

Total number of volumes, exclusive of bound papers, etc. 300

The following papers are provided by the College for the use of the students in the reading room:

Daily Globe, Daily Mail and Empire, Guelph Daily Mercury, Guelph Daily Herald, Farmers' Advocate, Journal of Veterinary Archives, Gardening, American Gardening, Florists' Exchange, Review of Reviews, Scientific American, Nature, American Naturalist, and the Canadian Magazine.

The majority of Ontario farmers cannot attend our College, and for that reason it becomes our duty to assist them in every way possible, as we are endeavoring to do by our work at farmers' institutes, correspondence on various matters, and the preparation of bulletins and reports; and, with that object in view, I venture to submit brief notes on a few of the latest works on agriculture in one or other of its various branches or departments This is done in the hope that some farmers may thereby be induced to read more widely and with greater advantage to themselves in the important work in which they are engaged.

I may add that we shall be pleased to recommend other simple works along such lines as stock raising, horticulture, floriculture, dairying, domestic economy, etc., if so desired.

"*The Fertility of the Land.*"—By I. P. Roberts. 415 pages, illustrated, price $1.00. Published by Macmillan & Co., New York.

This little work is the last published book of the Rural Science Series, edited by Professor L. H. Bailey of Cornell University. It sets forth Professor Roberts' philosophy of the means of maintaining the productivity of the land, and explains in a simple, clear and practical manner, the underlying reasons for the common things which the farmer does. It contains valuable chapters on the food required by plants; the development of the plow; the results of plowing; surface tillage; conservation of moisture; irrigation and drainage; farm manures—their care, preservation and application; commercial fertilizers; green manures; fallows and rotations. Every chapter is practical and up to date.

"*Heavy Horses; Breeds and Management.*"—By Biddell, Douglas and others. 219 pages, illustrated, price 3s. 6d., published by Vinton & Co., London, England.

The second edition of this work will be valued by all horse breeders. A description of each breed is written by its own specialist; and interesting details of the noted horses and of the foundation and history of the three breeds—Clydesdale, Shire and Suffolk—are given, together with chapters on the farm management of heavy horses, and the diseases and injuries to which these horses are subject. The book is illustrated by many full-page cuts and reproductions from photographs, well executed and printed on good paper.

"*Milk and its Products.*"—By H. H. Wing, 1897. 280 pages, illustrated, price $1.00. Published by Macmillan & Co., New York.

This forms another volume of the Rural Science Series, edited by Prof. L. H. Bailey, of Cornell University. The author's idea is to give to the dairymen, in simple, concise form, the principles underlying modern dairy practice. There are chapters on the secretion, composition, testing, ferments and fermentation of milk; the separation, ripening and churning of cream; the finishing and marketing of butter; milk for cheese; Cheddar cheesemaking; varieties of cheese; by-products of the dairy; butter and cheese factories, with an appendix of useful rules, tests and standards for dairy practice.

"*Soils and Crops of the Farm.*"—By G. E. Morrow and T. F. Hunt, 1895. 303 pages, illustrated, price $1.00. Published by Howard and Wilton Publishing Co., New York, U.S.A.

This volume has been recommended by the Pennsylvania Farmers' Reading Circle. Soils are treated as to their classification, composition, origin, uses, physical properties, improvement by manuring, drainage, irrigation, tillage and rotation of crops. Eighteen chapters are devoted to farm crops, especially the cereals, legumes and grasses. These are considered under the headings—history, production, uses, structure, composition, relations to climate, soils, manures, varieties, culture, harvest and diseases.

"*First Principles of Agriculture.*"—By E. B. Voorhees, 1896. 212 pages, price $1.00. Published by Silver, Burdett & Co., Boston, U.S.A.

The author in this work confines himself chiefly to two main subjects, viz., manures natural and artificial; the scientific feeding of stock.

A few chapters treat of soils, crops, principles of breeding, dairy products.

An appendix contains tables showing composition of fertilizers, fodders, feeds; also the co-efficients of digestibility of various feeding stuffs.

"*Economic Entomology.*"—By J. B. Smith, 1896. 481 pages, illustrated, price $2.00. Published by P. B. Lippincott Company, Philadelphia, U.S.A.

As the author states in his preface, he has tried to give an outline of the characteristics of insects generally; of those features that distinguish them from all other animals, and of those peculiarities upon which we must base our hope of conquering them. Part I., devoted to structure and classification, deals briefly with the various parts of the insect body, external and internal; with the digestive, circulatory, respiratory, nervous and reproductive systems, and finally with their growth and metamorphosis. Part II., comprising the bulk of the book, considers all the different orders in such a way that an intelligent reader may recognize at least the group to which an insect belongs and in most cases decide as to whether or not an injurious species is in hand. Part III., des-

cribes in a clear and concise manner the various insecticides, preventives and machinery now in general use. The author has kept in mind throughout his work, the direct needs of the agriculturist.

This book has been adopted as a text-book for our third year work in entomology.

"*Agriculture in some of its Relations with Chemistry.*"—By F. H. Storer, 1897. 3 volumes, price, $4.25. Published by Charles Scribner's Sons, New York, U.S.A.

This, the seventh edition of Storer's Agriculture should be welcomed by all agricultural students. The work has been revised and enlarged, and also put in a very neat and compact form.

"*The Book of the Dairy.*"—By W. Fleischman. Translated from the German by C. M. Aikman, 1896. 344 pages, illustrated, price $3.50. Published by Blackie and Son, London, England.

This work, although along the same line as Prof. Wing's "Milk and its Products," is more comprehensive, forming a very complete treatise on modern dairying in all its branches. For instance, in the chapter on the secretion, properties and composition of milk, the structure of the udder and teats is very fully described and illustrated, while the chemistry of the constituents of milk also receives some attention. Other chapters treat upon the extraction, immediate sale and testing of milk; milk in its relation to micro-organisms, dairying and bacteriology; the manufacture of butter; cheese and cheese making; preparation of keeping milk, fermented milk and the by-products of milk; and, lastly, the economic aspect of dairying.

"*Thomas Bates and the Kirklerington Shorthorns.*"—By C. P. Bates, 1897. 513 pages, illustrated, price $2.50. Published by Robert Redpath, Newcastle-upon-Tyne.

To breeders of Shorthorns or Durhams this work should be of great interest, containing, as it does, a complete history from 1400 to 1897 of this famous breed. The greater portion of the history is obtained from the papers and correspondence of the celebrated breeder, Thomas Bates of Kirklevington. Collings, Watson, Appleby and others receive their share of praise for the part which each took in the improvement of the shorthorn. The last chapter gives a full account of the dispersion of the Bates' herd, and of some of the great sales which took place during the last forty years, both in England and America.

The following list of books can be obtained in Ontario for the prices named, including postage:

First Principles of Agriculture, by E. B. Voorhees	$1 00
Soils and Crops of the Farm, by Morrow & Hunt	90
Economic Entomology, by J. B. Smith	2 25
Milk and Its Products, by H. H. Wing	90
Book of the Dairy, by Fleischman & Aikman	2 50
Heavy Horses; Breeds and Management, by Biddell, Douglas and others	90
Fertility of the Land, by Roberts	1 10
The Soil, by King	65

Respectfully submitted,

F. C. HARRISON,
Bacteriologist.

Ontario Agricultural College,
Guelph, December 1st, 1897.

PART X.

REPORT OF THE EXPERIMENTALIST.

To the President of the Ontario Agricultural College:

SIR,—I have the honor of herewith submitting for your consideration the report of the Experimental Department for the year 1897.

The work of this department during the part season has been very satisfactory. We submit the results of the various experiments with much confidence in their reliability and in their real practical value. That they will be appreciated by the farmers of Ontario, we have good reason to believe. While personally conducting about twelve thousand farmers through our experimental grounds the past summer, I do not remember hearing a complaint from any one of them regarding our experiments. We have tried to do good work, and we sincerely hope that the results will do good to others.

THE WEATHER. During the summer of 1897, the weather was most favorable to our field experiments. The lowest and the highest temperatures, and the total amount of rainfall for each month from May to October inclusive, will be found in the following table.

Months.	Minimum Temperatures.	Maximum Temperatures.	Total amount of Rainfall.
May	31.2 degrees	75.8 degrees	1.58 inches
June	34.5 "	82.0 "	1.96 "
July	49.4 "	93.2 "	4.80 "
August	40.4 "	84.0 "	3.43 "
September	28.0 "	90.0 "	.41 "
October	26.2 "	84.0 "	2 09 "

It will be seen from the foregoing table that there were only three months in the summer in which the thermometer did not reach the freezing point, namely the months of

June, July and August. In five of the six months above mentioned, the temperatures reached over 80 degrees above zero, the month of July showing the highest record, namely, 93.2 degrees. There were 14 27 inches of rainfall during the six months here reported. It will be noticed that the rainfall during the months of July and August was very heavy, as more than 50 per cent. of the whole amount for the half year came during those two months. September shows a very light rainfall, there being less than ½ inch on the level for the thirty days. These records were made in connection with the experimental department.

Experimental Grounds. The experimental grounds consist of about fifty acres located at the rear of the main college building. The soil in these grounds may be called an average clay loam. The plots vary in size from 1/8 to 1/160 of an acre, and the majority of them are uniform in size and shape, being ten links wide by one hundred links long, thus forming an area of 1/100 of an acre. The plots which number upwards of two thousand are separated by paths and roads, there being upwards of five miles of roads in these grounds.

About one-third of the whole number of plots used for experiments in 1897 were devoted to grain tests. These included experiments with varieties, dates of seeding, methods of cultivation, selection of seed, application of fertilizers, etc. In all instances, the grain plots were of a rectangular form and a stake was driven at each of the four corners of every plot. In most instances the grain was sown broadcast. A line was drawn around the separate plots, and the packages of grain, which had been previously weighed out were sown upon their respective plots inside the enclosure made by the line. After the crops reached the height of about two inches, a line was again placed around each plot, and the plants outside the plot limits were destroyed, thus the areas devoted to the different crops were made exactly uniform.

All necessary notes regarding the various characteristics presented by the different crops from time to time were taken throughout the entire season. Cutting was done with the cradle when each crop reached its proper stage of maturity. In order to have the results exactly uniform, nearly all the plots were cut by one person. As soon as the grain became sufficiently dry, it was hauled to the experimental barn in a wagon with a tight rack made specially for the purpose. The whole crop was immediately weighed and thrashed, great care being taken that no grain was lost and that no mixing occurred.

In order to find out the best kinds of grain for cultivation in Ontario, all the varieties obtainable throughout the Dominion of Canada have been secured, and also the leading ones from France, Germany, Italy, Sweden, Russia, England, Switzerland, Scotland, Hungary, Greece, Austria, Egypt, Japan, New Zealand, Australia, and the United States The most of these varieties have been carefully tested in the experimental department for several years in succession. All varieties are grown for a period of at least five years, unless they show themselves quite inferior within a shorter time. The ones which give the most satisfactory results are continued for a much longer period. We are pleased state that we have been successful in obtaining a few very excellent foreign varieties which have given better all around results than the best varieties which we have secured in Ontario. These leading varieties will be referred to when considering the results of the various experiments here presented.

Barley.

Test of varieties. In 1897, forty-six varieties of barley were grown in the experimental department. Of this number, fifteen were six-rowed, and nineteen two-rowed; and twelve were hulless varieties. Some of the varieties have been grown for nine, some for eight, some for seven and some for six years in succession, while the others have been grown for five years or less. The barley was all sown broadcast at the rate of one hundred pounds of seed per acre on plots exactly 1-100 of an acre in size. Equal amounts were sown on the different plots, and the seeding took place on the 28th of April

for the present year. The soil was comparatively new, this being the third crop taken from the land. No manure or fertilizers of any kind were applied to any of the crops.

Varieties.	No. of rows per head.	Results for 1897.			Average results for number of years grown.		
		Weight per measured bushel.	Yield per acre.		Weight per measured bushel.	Yield per acre.	
			Straw.	Grain.		Straw.	Grain.
Grown for nine years.		lb.	tons.	bus.	lb.	tons.	bus.
1. Mandscheuri	6	50.13	1.11	42.13	50.65	1.79	**63.61**
2. Oderbrucker	6	51.31	1.08	41.38	53.27	1.60	**55.92**
3. Scotch Improved	6	51.81	1.07	38.67	52.01	1.47	**53.65**
4. French Chevalier	2	50.81	1.59	33.90	52.12	1.89	**53.58**
5. Common Six-Rowed	6	50.75	1.17	43.92	52.37	1.40	**52.27**
6. Empress	2	48.75	1.32	28.46	52.15	1.68	**51.91**
7. Two-Rowed Italian	2	50.00	1.56	25.75	52.68	1.90	**47.40**
8. Kinna Kulla	2	50.25	1.14	31.54	51.71	1.62	**46.86**
Grown for eight years.							
9. New Zealand Chevalier	2	49.19	1.57	34.60	52.45	1.95	**53.07**
10. Early Minting	2	49.81	1.57	39.65	52.29	1.82	**51.13**
11. Mensury	6	50.00	1.20	37.60	51.48	1.36	**50.93**
12. Cape	6	44.13	1.03	36.46	46.91	1.35	**50.76**
13 Australian	2	50.94	1.37	33.46	52.89	1.74	**48.97**
14. Italian	2	49.69	1.32	39.98	53.51	1.71	**45.93**
Grown for seven years.							
15. California Brewing	6	45.63	1.21	41.44	46.22	1.44	**56.55**
16. Imperial Six-Rowed	6	49.00	.95	32.39	51.83	1.42	**56.48**
17. Six Rowed Baxter's Improved	6	48.56	1.23	36.13	51.71	1.49	**51.53**
18. California Chevalier	2	50.50	1.67	42.88	52.04	1.96	**51.45**
19. Highland Chief	2	49.88	1.50	40.63	52.36	1.64	**49.56**
20. Salzer's California Prolific	2	49.88	1.00	31.31	52.20	1.51	**46.50**
21. Duckbill	2	49.69	1.09	33.56	52.15	1.54	**46.29**
22. Carter's Goldthorpe	2	50.63	1.89	41.21	51.86	1.80	**46.29**
Grown for six years.							
23. Gold Foil Hansfords	2	50.00	1.80	52.08	52.41	1.85	**51.56**
24. Two-Rowed Canadian	2	49.06	1.80	56.06	51.89	1.60	**46.42**
25. Selected Canadian Thorpe	2	50.69	1.49	45.02	51.50	1.55	**43.20**
Grown for five years.							
26. Four-Rowed	6	48.69	1.52	47.17	51.22	1.27	**54.55**
27. Vermont Champion	2	50.75	1.47	47.15	53.39	1.65	**49.75**
28. Jarman's Selected Beardless	2	51.88	1.52	48.21	52.36	1.66	**48.30**
29. Jarman's Golden Champion	2	50.63	1.85	32.17	51.02	1.61	**37.09**
Grown for four years.							
30. Scotch	6	49.56	.98	38.15	50.12	1.36	**49.70**
31. North Western	6	49.25	1.11	38.31	50.17	1.40	**48.38**
32. Success	6	40.56	.93	27.02	46.19	1.16	**31.42**
Grown for two years.							
33. Silver King	6	49.38	1.10	38.35	49.97	1.13	**41.10**
34. Manitoba Six-Rowed.	6	51.13	1.14	34.77	50.88	1.11	**38.39**

The average yield of barley per acre for the year 1897, as determined from our experimental plots, was 38.6 bushels. This is 11.4 bushels per acre less than the average yield for 1896, and about 19 bushels per acre less than the average yield for 1895. Although

the average yield of barley per acre is less than usual, still the comparative yield of the varieties one with another is not necessarily affected, as it requires a variety of seasons to determine the relative value of the various kinds of grain, even when grown side by side. The weight of grain per measured bushel in 1897 is also below the standard of the last nine years, the average for this year being 49.5 pounds, while that for the last nine years is about two pounds more per measured bushel.

It will be observed from the second column of figures, that in weight per measured bushel there were only three varieties that came under the standard of 48 pounds, these being the Cape, California Brewing and Success. It will also be observed by examining the fifth column of figures that these varieties are usually very low in weight of grain per measured bushel, the Cape weighing only 46.9 pounds in the average of eight years, the California Brewing 46.2 in the average of seven years, and the Success 46.2 in the average of four years. The best quality of barley grown in 1897, as determined by the average weight per measured bushel, was produced by the Oderbrucker, 51.3 lbs.; Scotch Improved, 51.8; Jarman's Selected Beardless, 51.9 pounds; and the Manitoba Six-rowed, 51.1 pounds. Three of these were six-rowed varieties and the other was a two-rowed variety. It will also be observed, by examining the column giving the weight per measured bushel in the average results, that the Oderbrucker weighs very heavily, giving upwards of 53¼ lbs. per measured bushel in the average of nine years. One of the most important column of figures is the one at the right hand side of the table, which gives the average yield of grain per acre for the number of years in which the different varieties have been under experiment at the Agricultural College. It will be seen from this column that the Mandscheuri has given decidedly the largest average yield, the average being 63.6 bushels for the nine years' experiments. The Oderbrucker, which is also a six-rowed barley, and stands second in the list in yield of grain per acre, has given an average of nearly eight bushels per acre less than the Mandscheuri; but, at the same time, it will be observed that the weight of grain per measured bushel is nearly 2½ pounds greater than that of the Mandscheuri in the average of nine years' experiments.

The average yield per acre of the two-rowed varieties in 1897 was 38.8 bushels and that of the six-rowed varieties 38.3 bushels. This shows an average of ½ bushel per acre in favor of the two-rowed as compared with the six-rowed varieties. If we examine the column which shows the average results for a number of years, we find that some of the two-rowed varieties have given very good results, but on the whole the six-rowed varieties have taken the lead in yield of grain per acre.

There was not very much trouble from rust on the barley during the past season. The only varieties which were entirely free from lodging were Kinna Kulla, Salzer's California Prolific, Duckbill, Selected Canadian Thorpe, Vermont Champion and Jarman's Selected Beardless. Some of the other varieties, however, such as the Mandscheuri, Two-rowed Italian, Australian, Six-rowed Baxter's Improved, North-western and Silver King stood up exceedingly well.

Hulless Barley.

Test of varieties. Of the twelve varieties of hulless barley tested in 1897, five have been grown for eight years in succession, three for five years, one for four years, and one for two years, and two of the varieties were grown this season for the first time. As in the case of the two-rowed and six rowed varieties, the seeding took place on the 25th of April on plots of exactly the same shape and size as those used for the two rowed and six-rowed varieties.

As the grain of the hulless varieties of barley closely resembles those of wheat or rye, we have taken sixty pounds as the standard weight per measured bushel in calculating the yield. In examining the results for 1897, it will be seen that there was only one variety which came up to the standard of sixty pounds per measured bushel, this variety being the

Purple. In the average results for the number of years grown, however, four varieties, namely, Black Hulless, Three-rowed, Guymalaya and purple have each given grain weighing more than sixty pounds per measured bushel.

Varieties.	No. of rows per head.	Results for 1897.			Average results for number of years grown.		
		Weight per measured bushel.	Yield per acre.		Weight per measured bushel.	Yield per acre.	
			Straw.	Grain.		Straw.	Grain.
Grown for eight years:		lb.	tons.	bus.	lb.	tons.	bus.
1. Black Hulless	6	59.94	1.17	27.00	62 93	1.47	**38.17**
2. Guymalaya	6	55.94	1.29	24.43	58.01	1.38	**37.53**
3. Hungarian	6	56 75	1.24	27.17	58.96	1.49	**37.46**
4. Large Skinned	2	53.81	1.30	23.38	59 24	1.49	**32.33**
5. Three-rowed	6	54.56	1.14	15 22	60.24	1.25	**26.72**
Grown for five years:							
6. Guy Mayle	6	57 75	1.09	28.75	60.92	1 32	**43.53**
7. Purple	6	60.13	1.10	25.70	62.68	1.60	**40.29**
8. Smooth Hulless	6	52.13	1.03	11.62	59.73	1.51	**32.06**
Grown for four years:							
9. Winnipeg No. 2	6	56.25	1.40	20.70	59.33	1.65	**36.84**
Grown for two years:							
10. New White Hulless	6	54.13	1.22	15.27	57.13	1.29	**23.08**
Grown for one year:							
11. Hog		56.50	1.78	32.47	56.50	1.78	**32.47**
12. Dakota Silver Beardless		45.38	1.16	27.88	45.38	1.16	**27.88**

The average yield per acre of the twelve varieties grown in 1897 was 23.3 bushels per acre, which is about 12 bushels per acre less than the average yield in 1896. The Black Hulless, which stands at the head of the list in the yield of grain per acre, produces a large yield of grain which weighs well per measured bushel. This variety, however, is very weak in the straw, and in some soils it is almost sure to lodge very badly. The Hungarian, New White Hulless, and Smooth Hulless varieties possessed the stiffest straw among those tested in 1897.

Barley—Broadcasting and Drilling on Six Different Dates.

For three years in succession, an experiment has been conducted by sowing barley on six different dates, commencing on April 18th and closing on May 26th. In the experiments of 1896 and 1897, the grain was sown broadcast and with a grain drill on each of the six dates. In each of these years the plots were all similar in size, and the same quantity of seed was used in all cases The land upon which the experiment was conducted in 1897 produced a crop of roots in 1896. Farmyard manure at the rate of twenty tons per acre was applied to the land in preparation for the root crop. The crop on each plot was harvested when it reached its proper stage of maturity. The following table gives the results of the experiment conducted in 1897, and also the average results of the experiment conducted for three years in succession.

It will be observed from the above table that there is a marked difference in yield of grain per acre produced from the seed sown at different dates. The largest yield in 1897 was produced from sowing the grain with a grain drill on the 19th of April: and

the lowest yield was produced by sowing the grain with a grain drill on the 26th of May. We find by averaging the results from the broadcast seeding and also those from the drilled seeding that the drilled grain gave a little more than two bushels per acre over that sown broadcast.

Date of Seeding.	Average results from different methods of seeding.		Average results from different dates of seeding.			
	Broadcasted or drilled.	Yield of grain per acre. Average 2 yrs. 1896-97.	Weight per measured bushel.		Yield of grain per acre.	
			1897.	Average 3 yrs. 1895-7.	1897.	Average 3 yrs. 1895-7.
		bus.	lbs.	lbs.	bus.	bus.
April 18-19	Broadcasted	49.78	49.79	50.72	47.39	**49.48**
	Drilled	52.01				
April 22	Broadcasted	51.53	50 57	51.09	42.07	**49.28**
	Drilled	49.54				
May 1-4	Broadcasted	36.76	49.85	49.34	37.70	**40.61**
	Drilled	42.34				
May 9-10	Broadcasted	30.66	50.01	46.56	43.01	**35.80**
	Drilled	38.60				
May 18	Broadcasted	21.44	46.26	45.41	24.03	**25.76**
	Drilled	22.74				
May 25-29	Broadcasted	12.19	41.75	41.68	10.56	**15.52**
	Drilled	9.54				

The results of this experiment, which has been conducted for three years in succession in sowing grain at different dates, shows the advantage of early seeding in the case of barley. As there were only some three or four days difference between the first two dates of seeding, the results for these dates are not widely different. It will be seen that the seed which was sown in the first week in May gave a crop which yielded nearly nine bushels per acre less than that sown on April 22nd. The decrease in yield per acre is very marked during the advancing periods of the season. The average yield produced on May 25th and 26th is less than one-third of that produced on April 22nd.

Peas.

Test of varieties. There were forty-seven varieties of peas tested in the experimental department in 1887. Thirty-eight of these varieties have been grown from five, six, and seven years in succession, and the other nine varieties have been grown for less than five years. In 1897, three varieties have been grown for the first time. The land had received similar treatment previous to the sowing of peas as that described for the different varieties of barley. Seed of all the varieties was sown on the 29th of April upon plots exactly 1-100 of an acre in size. The grain was sown with a grain drill, which contained ten tubes, the tubes being on link (7.92 inches) apart. The quantity of grain sown varied from 2 to 4½ bushels per acre, according to the size of the grain and the manner of growth of the various kinds. The yields per acre have been calculated from the actual yield of the plots.

It will be seen from the following table that the yield of peas per acre was rather light in 1897, the highest among the forty-seven varieties being 33.1 bushels, and the lowest 14 55. In weight per measured bushel, the results of the past season are perhaps a little below the average. Twenty-six of the varieties, however, weighed heavier than the standard of 60 pounds per measured bushel, the highest weight being 65.38.

Varieties.	Results for 1887.				Average results for number of years grown.			
	Percentage of peas injured by weevil.	Weight per measured bushel.	Straw per acre.	Grain per acre.	Number of days from time of seeding until maturity.	Weight per measured bushel.	Straw per acre.	Grain per acre.
Grown for Seven Years:		lbs.	tons.	bus.		lbs.	tons.	bus.
1 White Wonder (New Zealand)	27	60.88	.63	20.65	97	63.47	1.11	**38 04**
2 Early Britain	34	56.75	.54	18 52	98	60.07	1.22	**37.51**
3 Field (New Zealand)	34	57.88	.61	22.13	93	62.02	1.26	**36.76**
4 Mummy	15	65.13	.73	23 15	101	64.12	1.48	**36.44**
5 Brown (New Zealand)	34	57.63	.94	25 22	100	59.64	1.47	**35.71**
6 Blue (New Zealand)	31	59 75	.62	22 53	100	62.57	1.13	**33.36**
7 Prussian Blue	30	60.75	1.52	22 68	106	62.19	1 55	**33.29**
8 Princess Royal	24	58 38	.69	19.58	98	60.35	1.17	**33.17**
9 Glory	36	58.88	.72	22.68	96	61.38	1.23	**32.78**
10 White Eyed Marrowfat	26	61.88	.82	21.72	102	62.25	1.41	**32.01**
11 Black Eyed Marrowfat	37	60.00	.77	17.00	102	61.61	1.33	**31.01**
12 Early Race Horse	32	57.38	.63	18.97	95	61.67	1.18	**31.01**
13 Multipliers	28	61.13	1.02	21.12	107	62.01	1.56	**29.28**
Grown for Six Years:								
14 Tall White Marrowfat	27	61.25	.97	23.38	100	61.93	1.56	**35.24**
15 New Canadian Beauty	31	61.63	.93	22.45	100	62.27	1.36	**31.77**
16 Canada Cluster	17	63.88	.95	24.30	99	63.15	1.47	**31.73**
17 Centennial White	27	60.88	.84	23.72	104	61.66	1.29	**30.87**
18 Golden Vine	25	60.50	.98	24.17	101	62.23	1.35	**30.46**
19 Royal Dwarf Marrowfat	26	61.25	.97	24 50	101	61.58	1.39	**30.36**
20 Potter	29	61.75	1.13	32 50	99	61.62	1.26	**30.05**
21 Cleveland's Advancer	29	61.13	.90	23.43	103	61.34	1.64	**29.61**
22 Scotchman	26	62.13	1.57	22 65	109	62.60	1.80	**29.44**
23 McLean's Advancer	33	51.63	.81	20.38	98	55.66	1.01	**29.39**
24 Sword	17	61.63	.96	29.72	103	62.06	1.38	**29.23**
25 Prince Albert	30	61.75	1 43	22.22	111	62.13	1.55	**28.39**
26 Canada Field	20	61.63	1 25	28 30	108	61 60	1.35	**27.68**
27 Striped Wisconsin Blue	14	63.00	1.76	29.63	109	62 77	1.54	**25.58**
28 Oakshott Field	12	57.88	1.52	20 08	114	54.51	1.63	**23.63**
29 Pride of the North	31	56 63	.56	14.55	96	59.76	1.00	**21.39**
Grown for Five Years:								
30 Chancellor	18	58.25	.80	21 75	90	63.32	1.30	**34.54**
31 William the First	32	55.88	.50	15.15	92	58.99	1.05	**33.93**
32 Nimble Taylor	42	57.88	.90	21.77	100	59.33	1.32	**33.91**
33 Common Grey	18	59.25	.94	25.42	101	58.79	1.39	**33 24**
34 Nine Pod	23	59.88	.75	22.37	101	59.58	1.37	**33.23**
35 D'Auvergne	20	60.13	.72	21.85	93	62 07	1.12	**31.44**
36 Early June	20	61.75	.90	24.25	101	62.30	1.34	**30.36**
37 Tall Turkish	33	59.13	.80	20.05	94	60.97	1.18	**29.77**
38 White Imperial	15	61.50	.87	20.15	100	61.32	1.30	**29.43**
Grown for Four Years:								
39 Improved Grey	45	56.63	.75	20.93	99	59.54	1.07	**33.43**
40 Crown	42	57.00	.70	20.05	98	60.08	1.25	**30.52**
41 Coffee	17	59.13	.94	17.68	104	60.11	1.42	**24.30**
Grown for Three Years:								
42 White Hundredfold	33	60.50	.86	25.45	98	62.01	1.44	**38.09**
Grown for Two Years:								
43 Lindsay	40	54.38	.85	20.75	94	55.83	1.04	**24.83**
44 Waterloo	47	53.38	.84	18.60	96	55.25	.91	**20.45**
Grown for One Year:								
45 Harriston Glory	12	63.50	1.11	33.10	91	63.50	1.11	**33.10**
46 Elephant Imperial Blue	18	63.50	.80	27.50	95	63.50	.80	**27.50**
47 Oddfellow	5	65.38	.97	16.98	107	65.38	.97	**16.98**

In order to get the material for the first column of figures in the foregoing table, the peas were all split and closely examined regarding the presence or absence of the pea

weevil (*Brucus pisi*). The percentage mentioned gives the full number of peas which were infested with the pea weevil. From general appearance the peas would not indicate nearly so much injury done as is recorded in the foregoing table, as in many instances the weevil was still located in the central part of the peas, owing to the peas having been treated with carbon bisulphide as soon as possible after harvest and before the weevil had done much damage. It will be observed that the Waterloo, Improved Grey, Crown, Nimble Taylor, and the Lindsay varieties of peas were the most affected; and the Oddfellow, Harrison Glory, and the Oakshott Field varieties of peas were the least affected this year. We hope to give this special feature of the work a considerable amount of attention in the future by examining the peas year after year, in order to find out which varieties are the least subject to the ravages of the pea weevil throughout several years. Our crop of peas in the experimental department has been treated for two years in succession as soon as possible after the crops were harvested in the autumn, carbon bisulphide being used for this purpose. As the result has proven very satisfactory indeed, and as a number of our readers may not have seen any bulletin treating on this subject, I give a very concise summary of the treatment of the weevily peas, which is simple in method and effectual in results. The treatment which we would recommend from our two years' experience is as follows: The peas containing the weevils should be placed in a comparatively air-tight box, barrel, bin, or room, either in bulk or in cloth bags. Flat dishes should then be placed on top of the grain, and after the carbon bisulphide is poured into them, the compartment containing the peas should be closed and allowed to remain undisturbed for forty-eight hours, in order that the vapors, which are two-and-a-half times heavier than air, may penetrate every portion of the receptable and do effective work. The weevils can be destroyed at any stage of their growth; but the treatment should not be attempted when the thermometer stands lower than ten degrees above zero, as it is claimed that the liquid would not vaporize sufficiently to work satisfactorily. I would strongly recommend treating the peas immediately after they are harvested and threshed in the autumn, and thus destroying the weevils, when they are still small and entirely enclosed in the peas. The vapors of the carbon bisulphide will penetrate the skins of the peas, and will thus destroy the weevil, before they have completed their work of destruction and have made their escape. Peas which are not treated in the autumn should be treated in the warm days of the winter or in the spring to check the spread of this troublesome insect.

Carbon bisulphide is a clear liquid which volatilizes very rapidly, and, as the vapors are very inflammable, great care should be taken to keep fire away from them. Carbon bisulphide can be purchased in small quantities from most druggists, or in large quantities from the manufacturers. It has been estimated that one-and-a-half pounds of the liquid is sufficient for each ton of the grain to be treated, if used to the best advantage possible.

If peas are badly infested with the pea weevil in the spring of the year, it is usually advisable to get them ground and purchase sound grain for seed. We have conducted an experiment for four years in succession, in which we have used sound peas, and peas that have been injured with the weevil for seed. The results show that only about one-third of the injured peas will germinate, and that the peas produced by them are usually much weaker and smaller than those produced by sound seed.

Special attention is directed in the foregoing table to the average number of days from the time of sowing the different varieties until their maturity. It will be seen that there is a great variation in the length of time required for the varieties to ripen. Among the forty-seven varieties under experiment, the Chancellor is the first and the Oakshott Field pea is the last to mature, there being a difference of twenty-four days in the ripening period of these two varieties. The Golden Vine variety, which is one of the best known peas throughout Ontario, occupies an intermediate position in the length of time required from seeding till harvesting.

It will be observed that the White Wonder variety of peas, which was obtained from New Zealand in 1889, occupies first place in average yield of grain per acre among thirteen varieties grown in the experimental grounds for seven years in succession. It

was distributed this year in small quantities for the first time. The White Wonder variety is suited to comparatively rich land, as the straw is not so long as that of many other varieties. The Early Britain pea, which stands second on the list in yield of grain per acre among the varieties grown for seven years, was imported from England, and has given very good satisfaction in the comparative results. It was distributed throughout Ontario in 1896 for the first time, along with three other varieties, and, in the average results of successfully conducted experiments carried on upon seventy-three different farms throughout Ontario, it occupied the highest place among the four varieties tested. It was again distributed for co operative experimental work in the spring of 1897. The Chancellor pea, which has now been grown in our plots for five years in succession, has given an average of 34 5 bushels per acre, and an average weight per measured bushel of 63.3 pounds. This is the earliest among the forty-seven varieties under experiment, as it has matured in an average of ninety days from the time the seed was sown. The Chancellor pea, which is a small white variety, gave the best results in the co operative tests in 1896, coming next to the Early Britain in the experiments over Ontario and even surpassing the Prussian Blue variety. Of all the varieties of early peas that have been tested, the Chancellor has given the best all round satisfaction up to the present time. The Egyptian and the grass varieties of peas are much different in character and growth from those reported in the foregoing table. The grass pea is a variety more suitable for fodder purposes than for the production of grain. The Egyptian variety, however, is a good producer of grain, but possesses a straw of inferior quality. These varieties have both been tested for four years in the experimental department. As they are both late in reaching maturity, the crops were unavoidably injured in 1897, and are therefore not mentioned in the foregoing table. In the average of four years' experiments, the Egyptian gave 36.2 bushels per acre, the grain weighing 61½ pounds per measured bushel; and in the average of three years' experiments, the grass pea gave an average of 15.3 bushels of grain per acre, which weighed 63½ per measured bushel. Both of these varieties are free from the ravages of the pea weevil.

Broadcasting and Drilling on Different Dates. Twelve plots were used in 1897 for an experiment in which peas were sown broadcast and with a grain drill at six different dates, commencing on April 19th and closing on May 26th. The plots were all 1/100 of an acre in size, and equal quantities of seed were used for the various plots. The drilling was done with an ordinary grain drill and the broadcasting was done by hand. The ground was harrowed after the seeding.

Dates of seeding.	Results from different methods of seeding.		Results from different dates of seeding *			
	Methods of seeding.	Yield of grain per acre. Average for two years.	Weight per measured bushel.		Yield of grain per acre.	
			1897.	Average for three years.	1897.	Average for three years.
		bush.	lbs.	lbs.	bush.	bush.
April 18-19.	Broadcasted	27.35	51.63	58.07	23.65	29.62
	Drilled	28.90				
April 22	Broadcasted	31.28	52.07	58.11	26.13	32.72
	Drilled	31.20				
May 1-4	Broadcasted	23.73	55.26	59.30	17.93	30.00
	Drilled	24.31				
May 9-10.	Broadcasted	19.45	55.69	59.48	16.38	28.49
	Drilled	22.33				
*May 18	Broadcasted	11.07	55.63	58.63	11.36	25.02
	Drilled	11.66				
*May 25-26	Broadcasted	10.15	59.01	60.35	9.68	23.59
	Drilled	9.20				

* The average results from the seeding of May 18th and May 25th and 26th, are for one year less than those from the seeding of the first four days.

It will be observed from the above table that, in the average of two years' experiments, grain sown with the drill has given better all round satisfaction, although on two dates the broadcast seeding gave a slight increase over the drilling.

When the results from seeding on different dates are taken into consideration, it will be seen that, on the whole, late seeding produced grain of very good quality, the highest weight of all resulting from the seeding of May 26th. In yield of per acre, however, it will be noticed that there is a gradual decrease from the second to the sixth seeding, the highest average yield being produced on April 22nd, and the lowest on May 26th. In some instances, however, it is found that even better results are obtained from sowing peas about the first of May as compared with any earlier date; but in 1897 the earliest date of seeding in the case of peas, gave the best results in yield of grain per

Spring Wheat.

Test of Varieties. In 1897, forty-eight varieties of spring wheat were under test in the experimental grounds. These include all the varieties introduced since the spring of 1893, and the leading varieties among all those introduced from 1888 to 1893. The plots for the spring wheat were similar to those used for the barley previously mentioned. The seeding took place on April 22nd. The grain was sown broadcast, and in nearly all cases at the rate of two bushels per acre. The large coarse varieties, as Bart Tremenia, Wild Goose, Medeah, Sorentino, Ontario, and Algiers, were sown at the rate of two and one-half bushels per acre.

The average yield per acre of the forty-eight varieties of spring wheat grown in 1897 was 16 bushels per acre. Although this is not a high yield. still it is 6.3 bushels per acre more than the average yield in 1896. It is, however, 10.7 bushels less per acre than the average yield of 1895, and only about one-half the yield of 1894. When it is considered, however, that our experiments extend over a period of several years, the average results of the different varieties for the full number of years which they have been grown in the experiments should indicate very well the comparative value of the different varieties for general cultivation. Some varieties do well in favorable years, while others, and especially strong growing sorts, are likely to give the best satisfaction in seasons in which the weather and other conditions are less favorable. Those kinds of spring wheat which will give the best satisfaction under varied conditions, as secured through experiments of several years, are varieties from which we may hope to receive the most satisfactory results in general use.

In yield of grain per acre, the Bart Tremenia, Wild Goose, Medeah, Sorentina and Algiers gave the largest yields among the coarse grained wheats; and the Herison Bearded, Saxonka, Konisburg, Red Fern, Red Fife, Colorado, Rio Grande, Washington. Wellman Fife and the Blue Democrat among the small grained varieties. Special attention is drawn to the Herison Bearded variety of spring wheat which was imported from France in the spring of 1889. This variety has given an average of over 26.5 bushels per acre in nine years' trials on the small plots of the experimental department. The weight per measured bushel of this variety has averaged 62⅓ lbs. It possesses a good strong straw, which is usually troubled but little with rust. Among fifty-seven varieties of spring wheat which were submitted to the Millers' Association, the Herison Bearded was selected as one of the nine first-class milling wheats. In the co-operative experiments, conducted over Ontario each year with four or five of the leading varieties of spring wheat, the Herison Bearded has made an excellent record. This variety is now grown in the large fields at this institution to the exclusion of all other varieties.

The Preston, Stanley and Percy varieties of spring wheat, which were furnished us through the kindness of Dr. Wm. Saunders, of the Central Experimental Farm, Ottawa, in the spring of 1896, gave better yields in 1897 than they did the first season. The tests with these, as with all other new varieties, will be continued for at least five years, in order that we may thoroughly study the capabilities of the different varieties under the varying conditions of several seasons.

	Varieties.	Nature of head.	Results for 1897.			Average results for number of years grown on plots.		
			Weight per measured bushel.	Yield of straw per acre.	Yield of grain per acre.	Weight per measured bushel.	Yield of straw per acre.	Yield of grain per acre.
	Grown for Nine Years:		lbs.	tons.	bush.	lbs.	tons.	bush.
1	Bart Tremenia	bearded	60.13	1.50	24.27	62.16	1.70	**27.97**
2	Herison Bearded	"	59.25	1.46	22.92	62.36	1.78	**26.57**
3	Pringle's Champion	"	58.00	.87	16.15	59.78	1.66	**24.06**
4	Saxonka	"	58.38	1.13	20.52	60.20	1.64	**23.76**
5	Konisburg	"	58.82	1.34	22.13	60.99	1.54	**23.53**
6	Holben's Improved	bald	54.19	.89	12.97	57.99	1.64	**21.73**
	Grown for Eight Years:							
7	Wild Goose	bearded	62.63	1.36	23.07	61.12	1.91	**32.36**
8	Red Fern	"	58.63	1.43	23.13	60.41	1.89	**29.29**
9	Medeah	"	58.50	1.51	24.63	60.40	1 70	**28.17**
10	White Russian	bald	54.75	1.15	14.90	57.91	1.76	**27.07**
11	Sorentino	bearded	57.82	1.65	25.10	59.24	1.82	**26.82**
12	Red Fife	bald	56.06	1.53	20.73	60.02	1.78	**25.93**
13	Algiers	bearded	56.44	1.69	26.98	57.47	1.80	**25.86**
14	White Fife	bald	55.19	1.24	15.32	59.85	1.56	**23.79**
15	Colorado	bearded	54.38	1.45	20.15	58.71	1.60	**22.51**
	Grown for Seven Years:							
16	Rio Grande	bearded	58.00	1.57	21.98	59.03	1.77	**24.82**
17	Mo. Carlin	"	57.13	1.27	19.27	58.62	1.82	**24.52**
18	Manitoulin	bald	54.06	1.03	14.17	58.30	1.52	**23.20**
19	Okanagan Valley Velvet Chaff	"	52.25	1.05	13.43	54.55	1.62	**22.53**
20	Washington	bearded	58.25	1.63	21.57	58.96	1.55	**22.52**
21	Saskatchewan Red Fife	bald	55.13	1.05	14.95	58.11	1.47	**21.43**
22	Salzer's Assiniboia Fife	"	54.38	1.10	15.15	57.95	1.34	**21.07**
	Grown for Six Years:							
23	Wellman Fife	bald	56.06	1.55	21.62	58.10	1.76	**25.35**
24	Lost Nation	"	54.50	1.01	13.07	57.68	1.64	**23.36**
25	Velvet Chaff Blue Stem	"	51.75	.96	10.63	56.13	1.59	**22.40**
26	New York	bearded	54.25	1.37	15.10	57.10	1.53	**20.68**
27	Manitoba Red	bald	54.00	1.27	15.22	58.00	1.53	**20.23**
28	Hayne's Blue Stem	"	51.00	1.20	11.62	55.45	1.59	**19.78**
29	Dakota Marvel	"	52.38	1.39	16.20	55.84	1.58	**19.70**
30	Campbell's White Chaff	"	51.06	1.31	14.58	53.74	1.26	**14.39**
	Grown for Five Years:							
31	Blue Democrat	bearded	57.31	1.65	21.62	58.75	1.78	**23.65**
32	Champion Bearded	"	57.82	1.28	17.35	58.52	1.58	**20.10**
33	Amethyst	bald	54.19	1.14	14.53	57.64	1.36	**19.31**
34	French Imperial	"	54.88	1.38	15.78	57.75	1.33	**18.65**
35	Ontario	bearded	56.25	1.47	9.22	56.81	1.73	**18.12**
36	Early Scotch Bearded	"	53.00	1.25	12.45	56.73	1.45	**16.66**
37	Scotch Fife	bald	54.00	1.08	12.45	57.33	1.12	**15.06**
38	Canadian Club	"	51.75	.95	12.65	55.33	.....	**14.31**
39	Niagara	"	51.00	.79	7.13	53.28	1.09	**11.67**
40	White Australian	"	49.00	.62	4.43	49.00	1.44	**8.54**
	Grown for Four Years:							
41	Salzer's Marvel	bald	52.50	1.03	12.30	55.74	1.19	**17.22**
42	Red North Dakota	"	55.13	1.03	12.30	57.19	1.11	**16.75**
43	May's Early Wonder	"	54.88	.99	12.08	54.88	1.06	**15.56**
	Grown for Three Years:							
44	Manitoba Hard	bald	54.25	.84	10.47	56.02	.80	**11.20**
	Grown for Two Years:							
45	Preston	bearded	55.25	.82	12.77	54.47	.64	**9.10**
46	Stanley	bald	53.88	.70	10.00	54.38	.63	**7.74**
47	Percy	"	53.38	.80	9.85	53.76	.70	**7.56**
48	Seven Headed	"	49.75	1.01	6.47	49.75	1.02	**4.46**

Broadcasting and Drilliag on Different Dates. In the spring of 1897, as in the spring of 1896, spring wheat was sown with an ordinary grain drill and broadcasted by hand. The plots used for this experiment were 1-100 of an acre in size, and the soil had received twenty tons of farmyard manure per acre in the spring of 1896, after which a crop of roots was grown on the land. The seed was sown at the rate of two bushels per acre in every instance.

Dates of seeding.	Methods of seeding.	Yield of grain per acre.		Average results for different dates of seeding.			
		1897.	Average for two years.	Weight per measured bushel.		Yield of grain per acre.	
				1897.	Three years.	1897.	Three years.
		bus.	bus.	lb.	lb.	bus.	bus.
April 18-19	Broadcasted	20.00	.....	55.91	59.96	18.86	**21.39**
	Drilled	17.72	20.37				
April 22	Broadcasted	14.22	16.60	55.25	58.26	13.83	**16.86**
	Drilled	13.43	16.93				
May 1-4	Broadcasted	11.93	12.19	55.06	57.95	13.60	**14.90**
	Drilled	15.27	15.79				
May 10	Broadcasted	9.12	9.54	54.56	57.51	8.78	**11.41**
	Drilled	8.43	9.01				
May 18	Broadcasted	2.55	3.57	47.07	52.36	2.37	**6.31**
	Drilled	2.18	3.23				
May 25-26	Broadcasted	1.62	2.11	44.00	51.75	1.62	**6.08**
	Drilled	1.62	1.65				

A very important feature of this experiment is the great advantage of early seeding. Experiments in sowing grain at different dates have been conducted in the experimental department for several years, and they have shown that while it is important to get oats and barley sown early in the spring, it is of still greater importance to have the spring wheat in the ground at the earliest possible moment after the ground is in a suitable condition for cultivation. In the experiments for 1897, we notice that there were four bushels per acre more from the grain which was sown on the 19th of April than that which was sown only three days later. As the time of seeding advanced, the grain crop decreased in both quantity and quality. In fact, it will be seen that there was less than two bushels per acre produced from the plots which were sown on the 26th of May. In weight of grain per measured bushel, there was a decrease from 59.9 pounds per measured bushel from the first date of seeding to 44.0 pounds per measured bushel from the last date of seeding.

Winter Wheat.

Test of Varieties. One hundred and eighty-nine plots were devoted to winter wheat experiments in 1897. The experiments conducted will be taken up under several different heads. In the variety experiment there were ninety-one kinds tested in the past season. Seed was sown at the rate of two bushels per acre on September 2nd, 1896, on plots 1/100 of an acre in size. The land upon which the wheat was grown had produced one crop since it was last manured, and the soil was worked as a bare fallow in the summer of 1896. The varieties ripened between the 21st and the 31st of July. Owing to the late harvest and the exceedingly wet season, no winter wheat bulletin was issued this year. A concise article, however, giving the summary results was sent to 352 newspapers.

Characteristics and Yields of Ninety-one Varieties of Winter Wheat.

Varieties—Arranged according to the last column of this table, which gives the average yield of grain per acre for the number of years grown.	Heads bearded or bald.	Color of grain.	Results for 1897.		Average results for number of years reported upon.						
			Weight of grain per measured bushel.	Yield of grain per acre (bush. 60 lbs.)	Date of maturity.	Height of crop.	Per cent. of straw lodged.	Percentage of rust.	Weight per measured bushel.	Yield per acre.	
										Straw.	Grain (bush. 60 lbs.)
Grown for six years:			lbs.	bus.	July.	ins.			lbs.	tons.	
1. Dawson's Golden Chaff	Ba.	W.	54.81	53.48	19	45.9	2	42	58.97	3.0	50.50
2. Golden Drop	Ba.	R.	59.44	57.60	20	46.5	41	28	61.16	3.3	48.35
3. Early Red Clawson	Ba.	R.	57.50	58.43	20	46.6	39	31	58.50	3.2	48.24
4. Egyptian	Be.	R.	57.25	52.30	21	48.0	33	22	60.13	3.2	47.82
5. Reliable	Be.	R.	58.06	50.12	20	48.1	26	16	61.09	3.2	46.10
6. Russian Amber	Be.	R.	56.88	48.07	21	46.4	31	17	60.73	3.0	44.68
7. American Bronze	Ba.	R.	55.88	43.90	21	48.3	2	45	58.73	3 1	42.98
8. Bulgarian	Be.	W.	56.06	43.07	22	48.9	20	24	60.26	2.7	42.26
9. Golden Cross or Volunteer.	Be.	R.	56.38	45.42	22	48.4	26	35	59.48	3.1	41.24
10. Red Velvet Chaff	Ba.	R.	52.06	36.35	21	48.5	33	29	57.34	3.3	40.64
11. Standard	Ba.	W.	53.13	38.75	22	46.4	15	33	57.61	2.7	39.29
12. Surprise	Ba.	W.	53.88	37.92	21	46.6	23	26	57.56	2.7	39.07
13. Bonnell or Landreth	Ba.	W.	53.13	37.30	22	49.3	24	24	57.86	2.9	38.97
14. Longberry Red	Be.	R.	57.94	42.35	21	46.2	51	20	60.49	3.0	38.23
15. Jones' Winter Fife	Ba.	R.	54.88	37.00	21	47.3	24	26	58.48	2.5	38.17
16. Velvet Chaff	Be.	R.	59.13	39.27	19	42.8	6	28	62.19	2.3	35.63
Grown for five years:											
17. Stewart's Champion	Ba.	R.	55.88	47.45	20	50.5	7	28	58.06	2.9	39.25
18. Soules	Ba.	W.	52.75	45.37	18	47.4	9	30	56.47	2.5	36.03
19. White Star	Be.	R.	57.19	48.70	19	47.7	12	27	59.28	2.4	35.98
20. Early White Leader	Ba.	W.	50.25	31.47	21	46.3	6	36	55.25	2.0	33.33
21. Treadwell	Be.	W.	57.00	44.17	20	48.7	8	23	59.00	2.3	32.19
Grown for four years:											
22. Early Genesee Giant	Be.	W.	54.88	56.98	20	48.9	12	30	59.40	3.3	50.10
23. Imperial Amber	Be.	R.	57.13	56.15	19	48.6	40	7	59.06	3 8	48.76
24. Tasmania Red	Be.	R.	59.00	45.83	18	45.0	54	12	61.10	3.3	45.73
25. Poole	Ba.	R.	58.06	48.02	19	46.4	31	13	60.22	3.2	44.86
26. Egyptian Amber	Be.	R.	57.94	46.88	18	47.9	42	8	60.76	3.6	44.65
27. Early Ripe	Ba.	R.	57.94	41.88	19	47.4	31	18	60.76	3.3	44.22
28. Siberian	Ba.	R.	58.00	43.90	20	47.4	37	16	61.23	3.1	42.20
29 Tuscan Island	Be.	R.	58.75	53.02	18	48.2	46	23	59.84	3.1	42.06
30 Emporium	Ba.	R.	57.56	49.73	20	49.9	38	6	58.87	3.5	41.83
31 Geneva	Be.	R.	60.13	46.25	17	45.5	42	10	61.91	3.2	41.79
32 Red May	Ba.	R.	59.00	45.42	17	46.4	32	11	61.48	3.0	41.66
33 Rudy	Be.	R.	57.38	49.58	17	46.2	47	19	59 87	2.8	41.65
34 Arnold's Hybrid	Ba.	R.	59.00	46.93	17	46.9	29	13	61.03	3.1	41.58
35 Bissell	Be.	R	58.75	46.72	17	45.3	49	7	60.81	3.0	41.16
36 Pride of Genesee	Be.	R.	54.44	41 58	19	48.6	37	13	59.81	2.8	41.15
37 New Columbia	Ba.	R.	55.38	38.48	18	45.4	23	16	58.25	3.0	41.90
38 McPherson	Ba.	R.	60.25	47.65	17	46.5	31	13	61.26	3.0	49 89
39 Zimmerman	Ba.	R.	57.94	45.65	19	45.8	23	13	60.69	2.7	39.76
40 Golden Tankard	Be.	R.	58.32	46.77	17	48.8	44	21	59.96	3.7	39 14
41 Andrew's No. 4	Be.	R.	55.69	46.88	21	49.5	28	23	58.92	3.2	38 72
42 Kentucky Giant	Be.	R.	59.25	48.90	20	47.7	37	15	59.29	2.8	38 18
43 Simcoe Red	Be.	R.	55.44	38.07	17	48.7	19	19	58.26	2.8	36 37
44 Penquit's Velvet Chaff	Be.	R.	59.38	45.52	18	45.5	17	28	60.90	2.5	35 83
45 Hindostan	Be.	R.	59.19	48.65	20	48.1	37	29	60.32	2.9	35 79
46 Turkish Red	Be.	R.	56.94	35.92	18	41.3	44	8	60.74	2.3	35 08
47 Currell	Ba.	R.	59.13	41.52	18	46.7	36	20	60.53	2.9	34 23
48 Jones' Square Head	Ba.	W.	53.19	27.50	19	46.1	7	28	57.17	2.1	32 23
49 Bullard's Velvet Chaff	Ba.	R.	58.38	46.67	22	47.6	12	25	59.97	2.3	30.42

CHARACTERISTICS AND YIELDS OF NINETY-ONE VARIETIES OF WINTER WHEAT.—*Concluded.*

Varieties—Arranged according to the last column of this table, which gives the average yield of grain per acre for the number of years grown.	Heads bearded or bald.	Color of grain.	Results for 1897.		Average results for number of years reported upon.						
			Weight of grain per measured bushel.	Yield of grain per acre (bush. 60 lbs.)	Date of maturity.	Height of crop.	Per cent. of straw lodged.	Percentage of rust.	Weight per measured bushel.	Yield per acre.	
										Straw.	Grain (bush. 60 lbs.)
Grown for three years :			lbs.	bus.	July.	ins.			lbs.	tons.	
50 Michigan Amber	Be.	R.	55.50	47.18	19	46.8	34	20	59.50	3.3	**46.53**
51 Giant Sqare Head	Be.	W.	50.00	47.03	20	48.0	27	42	56.93	3.3	**46.48**
52 Hunter's Wheat	Be.	R.	54.50	46.77	20	45.0	30	17	59.37	3.0	**42.32**
53 Pride of Illinois	Ba.	R.	55.25	39.80	17	43.9	40	23	59.48	2.7	**37.93**
54 White Bearded	Be.	W	49.50	37.23	20	42.5	10	30	56.17	2.2	**35.94**
55 German Emperor	Ba.	R.	53.38	40.47	19	46.2	51	18	58.46	3.1	**35.56**
56 Kalina	Be.	R.	53.75	38.75	21	37.7	32	45	58.05	2.5	**31.52**
57 Amherst Isle	Be.	R.	54.50	39.95	20	44.0	61	8	58.10	1.8	**31.45**
58 Mealy	Ba.	R.	55.00	39.90	19	46.9	34	28	59.07	2.2	**30.77**
59 Nonpareil	Be.	W.	52.00	38.02	22	46.9	26	38	57.60	2.2	**30.61**
60 Silver Star	Ba.	W.	48.50	29.07	22	44.3	14	47	56.97	2.3	**30.02**
61 Long Amber	Ba.	W.	44.94	26.22	24	54.7	15	50	52.58	1.9	**21.47**
Grown for two years :											
62 Queen Meg	Be.	W.	55.68	41.82	21	54.7	43	53	55.68	4.0	**49.26**
63 Murray's Hybrid	Be.	W.	51.13	36.35	20	52.7	48	45	55.27	3.1	**35.13**
64 Beattie's Victor	Be.	W.	51.25	31.43	21	54.7	21	53	55.43	3.0	**33.12**
65 Bailey	Ba.	W.	53.45	24.02	19	48.5	13	58	53.45	2.6	**32.31**
Grown for one year :											
66 Russian	Be.	R.	56.25	49.58	23	52.0	99	10	56.25	4.3	**46.58**
67 Buda Pesth	Be.	R.	56.63	49.17	28	50.0	98	35	56.63	3.9	**49.17**
68 World's Fair	Ba.	R.	55.38	48.75	24	62.0	75	50	55.38	4.4	**48.75**
69 Mac. Garvin	....	R.	54.88	48.33	26	56.0	50	70	54.88	3.6	**48.33**
70 Reliable	Be.	R.	58.44	47.35	28	52.0	95	40	58.44	4.7	**47.35**
71 Prize Taker	Ba.	W.	51.00	41.62	26	56.5	25	80	51.00	3.9	**41.62**
72 Diamond Grit	Be.	R.	54.63	40.10	26	62.0	35	60	54.63	4.3	**40.10**
73 White Golden Cross	Be.	W.	52.75	39.27	30	57.0	90	70	52.75	4.4	**39.27**
74 Roberts	Be.	R.	56.06	39.12	26	61.0	90	45	56.06	3.9	**39.12**
75 Bearded Winter Fife	Be.	R.	51.13	38.70	26	54.5	80	40	51.13	3.6	**38.70**
76 Eastman	Be.	W.	54.75	38.23	29	59.0	80	60	54.75	3.9	**38.23**
77 Wisconsin Triumph	Be.	R.	55.25	38.13	29	59.0	90	50	55.25	4.5	**38.13**
78 French Hero	Be.	R.	55.63	37.92	26	58.0	95	70	55.63	4.0	**37.92**
79 Red Cross	Ba.	R.	53.56	37.60	28	59.0	50	70	53.56	4.3	**37.60**
80 White Clawson	Ba.	W	49.88	37.13	26	61.0	35	70	49.88	3.9	**37.13**
81 Turkish Red Winter	Be.	R.	55.13	35.88	29	50.0	90	50	51.13	2.8	**35.88**
82 Bearded White Fife	Be.	W.	50.00	35.32	23	54.0	15	40	50.00	2.5	**35.32**
83 Johnson	Be.	W.	48.13	34.80	29	57.0	80	70	48.13	4.2	**34.80**
84 Gold Coin	Ba.	W.	52.06	34.53	28	57.5	75	100	52.06	4.0	**34.53**
85 Canadian Hybrid	Ba.	R.	54.00	34.48	29	54.0	80	50	54.00	3.4	**34 48**
86 Pedigreed Genesee Giant	Be.	W.	48.88	32.03	27	56.0	90	80	48.88	3.9	**32.03**
87 Long Amber	Ba.	W.	46.75	31.30	29	61.5	20	80	46.75	3.3	**31.30**
88 Ohio State	Ba.	W.	54.63	30.05	29	56.0	85	70	54.63	3.5	**30.05**
89 Early Oatka Chief	Be.	W.	57.38	29.53	28	54.0	95	50	57.38	4.3	**29.53**
90 Early Arcadian	Ba.	W.	48.38	29.02	26	59.5	75	100	48.38	4.3	**29.02**
91 Zerena	Ba.	W.	50 25	26.82	29	55.0	75	60	50.25	3.4	**26.82**

In this experiment with ninety-one varieties of winter wheat grown under similar conditions in 1897, it is found that the seven varieties which stand highest in yield of grain per acre are the same seven varieties which have given the largest average yield of

grain per acre among eighty-six varieties grown on the experimental plots for four years in succession. Although the comparative order of the yields of these seven varieties is not the same in 1897 as in the average of four years, still the fact that they gave the largest yield in both cases among all the varieties tested, is a very important feature in the experiment.

I wish to draw special attention to Dawson's Golden Chaff, which gave a yield of 50.50 bushels per acre in the average of six years' trials. It will be observed that this variety has given an average of over two bushels per acre more than the variety which stands next to it in yield of grain. In weight per measured bushel, however, the Dawson's Golden Chaff gave only an average of practically 59.0 pounds, while three of the other varieties among those which have been grown for six years in succession have given an average of over 61 pounds.

The Dawson's Golden Chaff winter wheat has been sent out over Ontario with several other varieties during each of the past five years. In these co-operative experiments, also, it has made an excellent record. The following are some of the conclusions regarding the different varieties of winter wheat tested on the farms throughout Ontario, including the year 1897: 1. "In average yield of winter wheat per acre, the Dawson's Golden Chaff stood highest among eleven varieties tested over Ontario in 1893, nine varieties in 1894, nine varieties in 1895, nine varieties in 1896, and seven varieties in 1897." 2. "The Dawson's Golden Chaff was the most popular variety with the experimenters in each of the past four years."

The Golden Drop, which stands second in average yield of grain per acre for six years, is a red grained variety. Special notice should be taken of this point, as there is also a white grained variety in circulation under a similar name, but which does not appear to be so good a variety as the one standing second in the above list.

The Early Genesee Giant variety has now been grown for four years in succession and has given satisfactory results. The straw grows about three inches higher than that of Dawson's Golden Chaff. It is a variety which seems to be well suited for comparatively poor land; but on rich soil it is apt to produce straw of a very coarse nature, and is not likely to fill so well as though the straw had not grown so abundantly.

Different Dates of Seeding. Two or more varieties of winter wheat have been sown at three different dates in the month of September in each of the past five years. The following table gives the average results for each date of seeding in 1897, and also for the five years in which these experiments have been conducted.

Date of seeding.	Yield of straw per acre.		Weight per measured bushel.		Yield of grain per acre.	
	1897.	Average 5 years.	1897.	Average 5 years.	1897.	Average 5 years.
	tons.	tons.	lbs.	lbs.	bush.	bush.
September 2-3	3.09	2.84	52.03	57.32	34.66	**38.40**
" 7-9	3.22	2.88	52.53	57.46	35.97	**37.67**
" 17-20	3.17	2.21	50.77	55.68	34.28	**30.95**

Although the results from the second date of seeding are slightly better than those from the first date of seeding in 1897, still the results for the five years' experiments show an average of about one bushel per acre in favor of the first date of seeding. The results from the seeding of September 17th to 20th show an average of two pounds per measured bushel, and a yield of seven bushels per acre less than those produced from the seeding of September 7th to 9th in the average results for five years. In consideration of the results of these experiments, and some other experiments which have been conducted in sowing winter wheat at different dates, it is found that the returns are not usually very satisfactory from sowing winter wheat later than the 9th of September at this institution.

Methods of Seeding. An experiment in sowing winter wheat broadcast and with a grain drill has been conducted in duplicate in each of the past four years. Uniform quantities of seed were used in this experiment throughout. The following table gives the average results for each method of seeding in 1897, and also those for four years in which this experiment has been conducted :

Method of seeding.	Weight per measured bushel.		Yield per acre.			
			Straw.		Grain.	
	1897.	Average 4 years.	1897.	Average 4 years.	1897.	Average 4 years.
	lbs.	lbs.	tons.	tons.	bush.	bush.
Drilled	55.29	58.62	4.10	2.68	36.69	**42.42**
Broadcasted	55.01	58.30	4.04	2.66	36.93	**42.40**

The average results from the sowing by the two methods are very similar, there being a very slight advance in those from the drilled crop. It should be understood, however, that the land was in excellent state of cultivation for both methods of seeding. Had the land been poorly worked, the results might have been much more marked in regard to the methods of seeding.

Different Quantities of Seed. In 1894, 1895, 1896, and 1897, two varieties of winter wheat were sown broadcast on similar plots at the rates of 1, 1½, and 2 bushels per acre. The treatment of the plots was the same in every respect, the only difference being in the amount of seed used. The following table gives the average results from each quantity used in 1897, and also for the four years in which this experiment has been conducted :

Quantity of seed sown.	Weight per measured bushel.		Yield per acre.			
			Straw.		Grain.	
	1897.	Average 4 years.	1897.	Average 4 years.	1897.	Average 4 years.
	lbs.	lbs.	tons.	tons.	bus.	bus.
1 bushel per acre	53.53	57.72	4.02	2.72	36.05	**38.56**
1½ bushels per acre	53.97	57.94	4.15	2.94	36.83	**42.52**
2 bushels per acre	54.91	58.38	4.45	3.18	38.28	**44.48**

It will be observed that in yield of straw and of grain the largest amounts were produced from the thickest seeding. Also in weight per measured bushel, the thickest seeding gave the most satisfactory results. The heaviest grain per measured bushel produced from the thickest seeding in 1895, 1896 and 1897. It must be remembered that this experiment was conducted on small plots. For wheat growers to determine the proper quantity of winter wheat to sow per acre in order to get the best results upon their respective farms, it will be advisable for them to observe and experiment for themselves, as very much depends upon the fertility of the soil and upon other conditions.

Selection of Seed. An experiment was conducted in 1897 in sowing large plump, small plump, shrunken, and cracked winter wheat seed of the Dawson's Golden Chaff and the Early Genesee Giant variety. The plots were exactly the same size in every instance, being 1/100 of an acre. Large plump seed was sown at the rate of two bushels to the acre. Exactly the same number of seeds of each of the other selections was used, as in the case

of the large plump seed. For the selection of cracked seed broken grain was picked from the two varieties of winter wheat which had been threshed with the separator, and in which there was more or less broken grain, as is frequently the case as a result of threshing. It was necessary, of course, to use exactly twice as many broken grains as whole grains in making the selection for this experiment. The following table gives the average results from each of the selections for 1897 :

Selections.	Weight per measured bushel.	Yield of straw per acre.	Yield of grain per acre.
	lbs.	tons.	bus.
Large plump seed	57.00	4.22	63.60
Small plump seed	56.75	3.80	59.93
Shrunken seed	57.47	3.45	56.77
Cracked seed	53.66	1.05	20.92

Large plump seeds produced $3\frac{2}{3}$ bushels per acre more than the small plump seed ; $6\frac{4}{5}$ bushels per acre more than the shrunken, and $42\frac{2}{3}$ bushels per acre more than the seed which had been broken with the machine in threshing. It seems rather strange that the shrunken seed produced grain which weighed slightly heavier per measured bushel than that produced from the large plump seed. As, however, the yield of shrunken seed was about seven bushels per acre less than that produced from the large plump seed, there was a better opportunity for the smaller crop to become more fully developed. It must be remembered that these results are simply for one year. It is our intention to continue this experiment for several years.

Sprouted Grain for Seed. As 4.8 inches of rain fell at the Agricultural College during the month of July, and as the heavy rains were quite general throughout the Province of Ontario, the farmers generally had much difficulty in getting their winter wheat harvest properly cured. As a result of the wet weather, the wheat was very badly sprouted in many localities. It became a burning question among the farmers as to the advisability of sowing sprouted seed this autumn. In order to glean some information in regard to the value of sprouted wheat for seed, an experiment was conducted in the month of August by placing different selections of seed in boxes where the percentage of germination and the character of growth could be closely watched. Fifty sound grains were planted in No 1 box ; fifty grains, which were slightly sprouted, in No. 2 box ; fifty grains, considerably sprouted, in No. 3 box ; and fifty grains, badly sprouted, in No. 4 box. In about two weeks after the grains were planted, the crop in No. 1 box showed 88 per cent. germination, and the plants an average of $3\frac{1}{2}$ inches in height ; in No. 2 box 66 per cent. of the seeds germinated, and the plants averaged $2\frac{3}{4}$ inches in height ; in No. 3 box, 16 per cent. of the seeds germinated, and the plants averaged $1\frac{1}{2}$ inches in height ; and in No. 4 box, 10 per cent of the seeds germinated, and the plants averaged $1\frac{1}{4}$ inches in height. Several other experiments were also conducted, each showing results very similar to those here given. All of the experiments conducted showed that wheat which is even slightly sprouted lacks in germinating power, and is apt to produce an uneven crop, as there was a great difference in the sizes of the plants from the sprouted seed.

Treatment of Soil During the Four Months Previous to Sowing. In the spring of 1896 twelve plots, each one rod wide by six rods long, were staked off for an experiment in different treatments of soil, preparatory to the growing of winter wheat. The experiment was conducted in duplicate, there being six plots in each set. The land had been plowed in the autumn of 1895 and received surface cultivation in the spring of 1896. Four plots in each were sown in the latter part of May with crops

to be plowed under later in the season. These crops were peas, buckwheat, rape, and crimson clover. The other two plots in each set were worked as a bare summer fallow throughout the season. About the first of August each of the green crops was plowed under and the land was then worked on the surface during the month of August. Farmyard manure, at the rate of twenty tons per acre, was applied to one of the bare summer fallow plots in each set. On August 25th the Pride of Genesee variety of winter wheat was sown on one of the sets, and the Bearded Winter Fife on the other.

Soil preparation in 1896.	Height of plants.	Weight per measured bushel.	Yield per acre.	
			Straw.	Grain.
	inches.	lbs.	tons.	bush.
Bare summer fallow and farmyard manure at 20 tons per acre	52.8	58.54	2.79	43.29
Green peas plowed under	52.3	58.63	2.37	39.43
Bare summer fallow	52.1	58.19	2.10	37.18
Green rape plowed under	49.6	57.44	1.73	31.66
* Green crimson clover plowed under	48.3	57.79	1.56	28.20
Green buckwheat plowed under	48.5	57.54	1.32	26 27

* The crimson clover for this experiment made a very poor growth.

It will be observed from the foregoing table, that land which was treated as a bare summer fallow throughout the summer and manured at the rate of twenty tons of farmyard manure per acre previous to the sowing of winter wheat, gave the largest yield of grain per acre. It should, however, be remembered that this was the most expensive of the six different treatments. Land upon which peas were used as a green manure produced a considerably larger yield of winter wheat per acre than similar land upon which rape or buckwheat had been used as a green manure or which had been worked as a bare summer fallow. Owing to the amount of work required for a bare summer fallow, this method of preparation is more expensive than any of the others except the bare fallow, which was also manured. Where green crops were plowed under there was the expense of the seed used. The amounts of seed used for the green manure crops were as follows: peas 2½ bushels per acre, rape 4 pounds, buckwheat 1 bushel, and crimson clover 12 pounds. This experiment, it must be remembered, has been conducted for only one year.

Treatment of Smut. An experiment in treating seed wheat for the prevention of smut has been conducted for two years with quite satisfactory results. Infected seed wheat not treated for smut produced a crop containing an average of 2,146 smut balls per bushel of grain; while that treated with potassium sulphide produced an average of 109 balls of smut; that treated with copper sulphate, twelve balls of smut; and that treated with hot water, nine balls of smut per bushel of grain. The hot water treatment, which is one of the cheapest and most effectual remedies, consists in immersing seed wheat for fifteen minutes in hot water at a temperature of 132 degrees F. The water should not go below 130 degrees and not above 135 degrees. Not only is the hot water treatment very effectual in killing the smut spores, but it frequently improves the productive power of the seed, as shown by the increased yield of grain per acre. Every farmer in smut-infected districts should treat sufficient seed to insure the harvesting of clean grain for seed for the following year.

Effect of Cutting at Different Stages of Maturity. Five plots each of Dawson' Golden Chaff and the Early Genesee Giant varieties of winter wheat were sown on the same day in 1893, 1894, 1895 and 1896. The plots were 1/100 of an acre in size in every case. The seeding was done by hand at the rate of two bushels per acre.

Each of the varieties reached the stage of maturity at which winter wheat is usually cut in Ontario on the 19th of July in 1894, 18th of July in 1895, 11th of July in 1896, and the 20th of July in 1897. The two varieties were cut at five different periods in each of the four years commencing on July 4th in 1894 and in 1895, on June 30th in 1896, and on July 6th, 1897. The period between the cuttings were one week in length. The average dates of cutting, taking the four years into consideration, are as follows: First cutting, July 4th; second cutting, July 11th; third cutting, July 18th; fourth cutting, July 25th; fifth cutting, August 1st. The following table gives the results from each cutting in 1897, and also in the average of four years:

Date of cutting. (Average four years.)	Weight per measured bushel.		Yield per acre.			
			Straw.		Grain.	
	1897.	Average 4 years.	1897.	Average 4 years.	1897.	Average 4 years.
	lbs.	lbs.	tons.	tons.	bus.	bus.
July 4th	38.38	51.61	5.46	3.75	14.53	**31.99**
" 11th	53.32	58.91	5.31	3.54	47.89	**49.54**
" 18th	55.13	59.45	4.80	3.32	57.55	**51.64**
" 25th	53.07	57.58	4.29	3.16	55.28	**52.25**
August 1st	52.00	56.44	4.41	3.18	48.82	**49.30**

In each of the four years the greatest yield of straw was obtained from the first cutting, and the heaviest weight of grain per measured bushel from either the second or third cutting. The yields of grain per acre were best from the last cuttings in 1894 and in 1896, from the second last in 1895, and from the third last in 1897. The lowest results in yield of grain per acre, and in weight per measured bushel, were obtained from the first cutting of each variety in each year. The quality of the straw was the best from the first two cuttings and was the poorest from the last two cuttings.

Value of Grain for Seed as Affected by Cutting. For three years in succession an experiment has been conducted in sowing seed from two different varieties of wheat which had been harvested at five different dates, with a period of one week between each two dates. The first cutting took place when the wheat was in the milk condition, and the third when the wheat was in the condition usually harvested in Ontario, while in the case of the last cutting the wheat was very ripe. As this experiment is rather complicated, and as it is to be continued for several years to come, simply a reference is made to it in this report. We look upon this as a very important line of investigation, and hope to obtain some valuable conclusions by the time the experiment has been conducted for a period of five years or more. In the average results of experiments for the last three years, it is found that the heaviest weight per measured bushel, and the largest yields of grain and of straw per acre, were produced from the ripest seed.

Oats.

Test of Varieties. Although the number 103 represents the varieties of oats tested in the experimental department in 1897, still it does not by any means include the full number of varieties of oats that have been tested here within the past ten years. After varieties have been grown and the results carefully determined for five years in succession, the unworthy varieties are then dropped from our list and only the most valuable ones retained for further experiment and comparison. The seventeen varieties of oats which were grown in the experimental department in 1897, for the ninth year in succession, were selected as the best among eighty-one varieties which were grown on the

plots from the years 1889 to 1893 inclusive. The varieties grown during the past season, for the seventh and sixth year, are also the leading varieties among the new kinds which were tested for the first time in 1891 and 1892 respectively.

	Varieties.	Nature of head.	Color of grain.	Results for 1897.			Average results for number of years grown.		
				Weight per measured bushel.	Yield of straw per acre.	Yield of grain per acre.	Weight per measured bushel.	Yield of straw per acre.	Yield of grain per acre.
	Grown for nine Years:			lbs.	tons.	bus.	lbs.	tons.	bush.
1	Joanette	Spreading	Black	33.25	2.48	62.82	35.57	2.77	**86.08**
2	Siberian	"	White	30.75	1.80	53.12	34.58	2.69	**79.91**
3	Oderbrucker	"	"	27.00	1.70	56.21	31.27	2.54	**79.29**
4	Waterloo	"	"	28.88	1.66	49.68	31.30	2.54	**77.60**
5	Probsteier	"	"	26.63	1.72	51.79	32.13	2.46	**77.59**
6	Danebrog	"	"	28.75	1 56	46.71	32.54	2.44	**75.61**
7	Bavarian	"	"	30.63	1.71	46.38	31.37	2.71	**74.95**
8	Improved Besthorne	"	Yellow	28.13	1.86	55.24	32.49	2.17	**74.71**
9	Poland White	"	White	33.63	2.03	39.71	36.80	2.50	**72.70**
10	Georgian	"	"	32.00	2.00	44.44	32.55	2.70	**70.57**
11	Yellow Gigantic	Main	Yellow	27.00	2.21	40.85	28.83	2.66	**69.81**
12	Egyptian	"	White	33.50	2.46	46.65	35.07	2.77	**69.39**
13	Black Poland	"	Black	24.00	2.36	32.00	29.19	2.81	**65.64**
14	Rosedale	"	White	34.75	1.82	45.74	34.44	2.74	**64.87**
15	Victoria White	Spreading	"	36.13	1.40	41.00	39.00	2.50	**64.64**
16	Black Champion	Main	Black	25.25	1.76	32.00	28.98	2 52	**64.39**
17	Black Tartarian	"	"	23.13	1.71	27.62	30.49	2.65	**62.59**
	Grown for seven Years:								
18	White Schonen	Spreading	White	27.75	1.47	48.91	31.81	2.26	**79.96**
19	Vick's American Banner	"	"	26 50	1.57	48.68	30.67	2.28	**79.12**
20	Danish	"	"	26.00	1.52	46.06	24.51	2.22	**77.01**
21	Wide Awake	"	"	27.38	1.62	45.82	32.94	2 26	**76.85**
22	White Mane	"	"	26.50	1.52	48.62	31.46	2.56	**76.55**
23	Holstein Prolific	"	"	27.00	1.62	48.59	31.72	2.14	**76.21**
24	Magnet	"	"	27.88	1.58	42.24	30.53	2.53	**75.45**
25	Early Calder	"	"	28.00	1.40	47.24	31.88	2.32	**73.60**
26	Golden Giant	Main	Yellow	24.75	1.94	40.59	28.04	2.43	**73.35**
27	Giant Swedish	"	"	24.25	1.79	42.06	28.47	2.46	**72.14**
28	Early Gothland	"	White	33.50	1.77	42.88	35.53	2.35	**65.68**
29	Clydesdale	Spreading	"	35.00	1.41	34.82	37.80	2.44	**64.47**
30	White Belgium	"	"	34.75	1.20	35.62	37.60	2.25	**63.63**
31	Japan	"	"	36.75	1.40	38.18	31.82	2.31	**62.93**
32	White Swiss	Main	"	34.13	1.16	43.71	35.66	2.24	**62.66**
33	Giant Yellow	Spreading	Yellow	34.25	1.10	32.68	34.88	2.14	**62.54**
34	Black Mane	Main	Black	25.75	1.57	31.03	29.40	2.32	**59.58**
	Grown for six years:								
35	White Baltic	Spreading	White	29.75	1.37	42.79	34.49	2.20	**67.89**
36	Abyssinian	Main	"	34.00	1.86	46.65	35.98	2.48	**62.44**
37	American Beauty	"	"	34.63	1.75	47.21	29.02	2.35	**60.77**
38	Thousand Fold	"	"	33.75	1.89	41.91	35.15	2.33	**58.08**
39	Badger Queen	Spreading	"	37.63	1.29	38.79	39.36	2.23	**56.34**
40	New Wonderful	"	"	37.00	1.25	38.09	38.95	2.09	**55.26**
41	Wilson's White Prolific	Main	"	32.88	1.76	40.85	32.44		**53.31**
	Grown for five years:								
42	Improved American	Spreading	White	26.13	1.89	60.71	31.19	2.20	**71 69**
43	New Zealand	"	"	29.25	2.29	62.56	31.25	2.31	**70.78**
44	New American	"	"	26.38	1.43	45.41	30.60	2.13	**69.85**
45	Green Mountain	"	"	26.50	1.67	54.59	30.63	2.01	**68.75**
46	Lincoln	"	"	26.25	1.54	46.32	32.86	2.08	**66.82**
47	High Bred	"	"	33.88	1.76	37.41	37.07		**65.83**
48	Black Beauty	"	Black	28.13	1.21	37.41	32.47	2.04	**65.19**
49	Pringle's No. 6	Main	White	25.38	1.98	38.15	31.13	2.61	**62.55**
50	Excelsior	Spreading	"	25.88	1.53	42.09	30.24	2.36	**62.47**

OATS.—COMPARATIVE TEST OF 103 VARIETIES.—*Concluded.*

No.	Varieties.	Nature of head.	Color of grain.	Results for 1897.			Average results for number of years grown.		
				Weight per measured bushel.	Yield of straw per acre.	Yield of grain per acre.	Weight per measured bushel.	Yield of straw per acre.	Yield of grain per acre.
	Grown for five years:—*Con.*			lbs.	tons.	bus.	lbs.	tons.	bus.
51	Royal Prize Cluster	Spreading	White	33.25	1.29	34.32	38.19	2.17	**59.12**
52	South Carolina Black	"	Black	32.13	1.02	36.82	33.43	2.15	**58.77**
53	Rust Proof	"	White	34.75	1.27	36.85	35.14	2.22	**58.72**
54	Jarman's White Monarch	"	"	34.75	1.32	38.56	36.68	2.25	**57.18**
55	North Star	"	"	34.63	1.51	39.21	37.69	2.01	**54.92**
56	Challenge	"	"	30.75	2.00	39.53	36.00	2.47	**54.86**
57	Jarman's Black Defiance	Main	Black	23.13	1.95	29.32	27.37	2.35	**52.30**
58	Texas Rust Proof	Spreading	Dun	24.25	1.39	34.56	26.73	2.10	**43.20**
	Grown for four years:								
59	Peerless	Spreading	White	25.88	1.67	53.35	30.45	2.55	**82.16**
60	Bolton	"	"	25.50	1.52	51.74	30.79	2.21	**75.85**
61	Surprise	"	"	27.88	1.52	48.94	32.02	2.46	**75.57**
62	Bonanza King	"	"	25.75	1.66	46.74	31.97	2.09	**73.61**
63	Negro Wonder	"	Black	27.00	1.59	44.71	31.51	2.31	**72.76**
64	Improved White Russian	Main	White	26.50	1.79	53.32	31.55	2.45	**71.07**
65	Hull	"	"	25.50	2.36	42.24	30.43	2.60	**68.10**
66	Pride of America	"	"	34.13	1.99	43.24	35.89	2.56	**67.91**
67	White Swede	"	"	26.38	2.34	46.26	31.94	2.67	**67.63**
68	Australian Square Head	"	Yellow	24.00	1.94	40 53	29.02	2.44	**65.92**
69	Lousinee	Spreading	White	25.25	1.65	48.44	30.78	1.69	**58.57**
70	Mammoth Cluster	Main	Black	22.25	2.00	32.26	27.82	2.46	**58.25**
71	Salzer's Great Northern	Spreading	White	25.88	1.47	51.74	31.13	1.66	**55.93**
72	Red Tamworth	"	Dun	22.50	.96	29.00	25.94	1.85	**45.76**
	Grown for three years:								
73	New Electric	Spreading	White	25.25	1.41	46.74	29.94	2.17	**77.56**
74	Nameless Beauty	"	"	24.63	1.52	48.79	29.51	2.21	**77.42**
75	New Siberian	"	"	26.25	1.69	44.71	30.12	2.48	**75.65**
76	White Bedford	"	"	25.13	1.58	42.38	26.31	2.38	**74.67**
77	Black Diamond	"	Black	28.75	1.67	45.76	32.59	2.27	**74.38**
78	Daubeney	"	White	32.88	.90	47.00	35.13	1.51	**73.21**
79	Mexican Grey	"	Mixed	28.50	1.49	38.97	31.50	2.14	**68.72**
80	White Superior Scotch	"	White	37.00	1.11	34.94	39.91	1.98	**62.11**
81	Prolific Side	Main	"	33.25	1.56	37.74	35.28	2.38	**58.68**
82	Royal Doncaster	Spreading	"	34.75	1.26	34.50	34.83	2.19	**54.15**
	Grown for two years:								
83	Illinois	Main	White	28.38	1.53	48.06	31.29	1.74	**59.77**
84	Early Golden Prolific	Spreading	"	28.63	1.37	45.82	30.51	1.84	**57.70**
85	Danish Island	"	"	26.13	1.52	45.76	28.01	1.86	**56.29**
86	Abundance (O.A.C.)	"	"	27.63	1.38	45.59	28.26	1.89	**56.11**
87	Pearce's Black Beauty	"	Black	29.38	1.53	45.53	31.26	1.80	**54.05**
88	Abundance (D.E.F.)	"	White	27.00	1.31	46.74	26.75	1.91	**54.01**
89	White Star	"	"	29.50	1.51	43.65	31.35	1.91	**52.01**
90	Michigan University	"	"	28.25	1.66	48.26	30.53	1.86	**51.38**
91	Improved Ligowa	"	"	29.75	1.55	38.50	28.47	2.16	**49.17**
92	White Dutch	"	"	36.13	1.42	31.03	36.22	2.03	**44.23**
93	Fife	Main	"	32.50	2.03	42.29	29.88	2.02	**39.98**
94	Black Irish	"	Black	24.38	1.65	24.91	26 44	2.14	**37.78**
95	Perpetuated White Tartarian	"	White	18.88	2.40	22.12	23.32	2.17	**30.00**
	Grown for one year:								
96	Salzer's Gold Mine	Spreading	White	25.50	1.84	50.65	25.50	1.84	**50.65**
97	Tyrolian	"	"	30.13	1.55	49.91	30.13	1.55	**49.91**
98	Newmarket	"	"	28.25	1.63	42.38	28.25	1.63	**42.38**
99	Golden Tartarian	Main	Yellow	23.00	1.88	37.88	23.00	1.88	**37.88**
100	New Seizure	"	"	22.50	1.83	36.50	22.50	1.83	**36.50**
101	Whiteside	Spreading	White	34.38	1.42	33.91	34.38	1.42	**33.91**
102	Washington	"	"	31.50	1.58	30.74	31.50	1.58	**30.74**
103	Mortgage Lifter	"	"	35.00	1.31	30.38	35.00	1.31	**30.38**

The plots used for the variety tests for oats in 1897 were all exactly the same in size and shape, each plot being ten links wide by 100 links long, thus making 1-100 of an acre. The grain was sown broadcast at the rate of seventy-five pounds per acre, and the seeding took place on the 23rd of April, except in the case of the two varieties, numbers 101 and 102, which were sown on April 24th. The land on which the oats were sown was an average clay loam which was comparatively new, having produced only two crops previous to the one of 1897. This land has never received any manure or fertilizers.

It is rather a striking feature in connection with the tests of the different varieties of oats, that in nearly all cases the varieties which have given the most satisfactory results for a number of years possess a spreading head. This is somewhat different from what some farmers would expect, as the varieties of oats which possess a side or main head give the impression when standing in the field that the yield of grain will be large, but when the crop is harvested it is frequently found that the impression which had been formed was not a true index of the productiveness of the grain. A careful study of the foregoing table will show the comparative results of the varieties possessing heads of a side and of a spreading character.

It will be noticed that but few of the black oats rank high in the comparative results. The Joanette, however, which is a variety only suited for good rich soil on account of its very short straw, is an oat which has given the largest average yield of grain per acre among all the varieties under experiment. This little French black oat has certainly left all the other black oats behind in regard to productiveness of grain. The Black Tartarian, which has been grown over Ontario more or less for a good many years, stands the lowest in yield per acre among the seventeen varieties which have been grown for nine years in succession.

It will be observed that the yield of oats in 1897 was much lower than the average of the past few years; the highest yield in 1897 being that of the Joanette, which was 62.8 bushels, and the lowest yield that of the Perpetuated White Tartarian, 22.1 bushels per acre. The quality of the grain produced during the past year was inferior. Quite a number of the varieties produced grain which weighed less than thirty pounds per measured bushel.

The reader's attention is directed especially to the three columns to the right of the table, which represent the average results for the number of years that each variety has been grown in the experimental department. These results should carry with them much weight, as they are from experiments which were conducted each year on plots that were the same in cultivation, state of fertility, etc. If a person has soil which naturally produces a large amount of straw, it will be well for him to select a variety which produces a straw somewhat below the average in yield per acre. Another person having a soil which naturally produces a small amount of straw, will be wise in selecting a variety which the average results show to be capable of producing straw in abundance.

Although the Joanette variety of oats stands at the head of the list in yield of grain per acre, still, as this variety possesses a very short straw, the Siberian variety, which stands second on the list in yield per acre, gives better results on the majority of farms throughout Ontario. Although the Siberian shows an average of only about four-fifths of a bushel per acre more than the American Banner, still it will be observed that the Siberian, in those two years, did not make a very high record, and therefore the average for the nine years is somewhat lower on this account. By comparing the average yield per acre of the Siberian with the Banner for the past seven years, we find that the former has given about five bushels per acre more than the latter, and has produced a grain which weighs on the average about three pounds per measured bushel more than the Banner.

The Abundance variety of oats was grown in our trial grounds from 1889 to 1893 inclusive; and, after a test of five years along with eighty other varieties, it was dropped as not being one of the best seventeen kinds. As the Abundance at the Central Experimental Farm, Ottawa, appeared to be giving good results, a small quantity was received, through the kindness of Prof. Wm. Saunders, and sown for comparison with the

Abundance which we had grown, as indicated above. These two samples have now been tested on plots side by side for two years in succession, and the results from them are very similar. One of the greatest weaknesses which we have found in regard to the Abundance oats, in our seven years' trials, is its comparatively low record in average weight per measured bushel.

Much more could be said in regard to the various varieties in the foregoing tables, but, as the results are placed very clearly in tabulated form, the reader is left to give the results a careful study and compare the varieties with which he is not familiar with those in the list with which he has been acquainted for several years, and thus glean information regarding the merits of the varieties under examination.

Broadcasting and Drilling. In 1897 an experiment was conducted on twelve plots by sowing oats at six different dates. The oats were sown at the rate of seventy five pounds per acre with an ordinary grain drill and also by hand on the six dates, beginning on April 18th and ending on May 26th. Each plot was 1-100 of an acre in size, being 10 links wide by 100 links long.

Date of seeding.	Results from different methods of seeding.		Results from different dates of seeding.			
	Methods of seeding.	Yield of grain per acre. Average, two years.	Weight per measured bushel.		Yield of grain per acre	
			1897.	Average, 3 years.	1897.	Average, 3 years.
		bus.	lbs.	lbs.	bus.	bus.
April 18-19	Broadcasted	68.97	28.82	33.19	62.43	**82.95**
	Drilled	78.01				
April 22	Broadcasted	78.90	27.75	32.59	64 35	**89.83**
	Drilled	81.31				
May 1-4	Broadcasted	57.96	23 38	30.73	48.97	**74.10**
	Drilled	64.59				
May 9-10	Broadcasted	38.35	21.38	28.42	40.85	**59.40**
	Drilled	47.55				
May 18	Broadcasted	23.69	20.13	25.90	23.15	**39.71**
	Drilled	28.35				
May 25-6	Broadcasted	15.97	18.57	22.40	23.21	**36.16**
	Drilled	19.18				

It will be seen that, in the case of oats, the grain which was sown with a grain drill gave much better results than that which was sown broadcast at each of the six different dates. The results in favor of the drilled grain are more marked in the case of oats than in that of peas, spring wheat or barley.

As in 1896, grain which was sown on April 22nd gave a larger yield per acre than which was sown three and four days previous. In the average of three years' experiments it will be seen that the first date of seeding has given about seven bushels per acre less than the second date. A very striking feature in connection with the experiment is the average decrease in yield of grain per acre from the second to the sixth date of seeding. It will also be noticed that there is a marked difference in yield of grain per acre from the first to the last date of seeding. The grain produced from the seed sown on April 18th and 19th weighed about one-half more per measured bushel than that which was sown on the 25th and 26th of May.

Spring Rye.

Test of Varieties. For three years in succession the Prolific Spring and Dakota Mammoth varieties of rye have been grown in competition in our experimental grounds.

In 1897 the Colorado Giant rye was grown for the first time. These varieties were sown upon plots 1-100 of an acre in size on April 22nd. The grain was sown broadcast at the rate of two bushels per acre.

Varieties.	Results for 1897.			Average results for number of years grown.	
	Weight of grain per measured bushel.	Yield per acre.		Weight of grain per measured bushel.	Yield of grain per acre.
		Straw.	Grain.		
Grown for three Years:	lbs.	tons.	bus.	lbs.	bus.
1. Prolific Spring	55.00	2.62	26.00	56.39	**33.92**
2. Dakota Mammoth	56.94	2.05	28.41	57.73	**33.25**
Grown for one Year:					
3. Colorado Giant	52.94	1.52	16.30	52.94	**16.30**

It will be observed from the foregoing table that the yield of grain per acre and the weight per measured bushel for this year are both somewhat lower than the average for the past three years. The heaviest weight of grain per measured bushel in 1897 was 56.9 pounds, while that of the Colorado Giant weighed only 52.9 pounds. The results of the Prolific Spring and the Dakota Mammoth varieties have been very similar during each of the past three years, the average results showing a difference of less than one bushel per acre in yield of grain. The Colorado Giant, which is a large, coarse grained variety, gave a very poor yield in the experiments of the present year. The St. John's variety, which is not mentioned in the above table, was also down. It is claimed for this variety that it is suitable for seeding either in the spring or in the summer. The spring sowing, however, proved to be unsatisfactory, as the yield of grain produced was less than two bushels per acre.

Buckwheat.

Test of Varieties. Three varieties of buckwheat have been grown in the experimental department for four years in succession. The plots used for the experiment in 1897 were 1-100 of an acre in size. The buckwheat was sown broadcast at the rate of one bushel per acre.

	Weight per measured bushel.		Yield of straw per acre.		Yield of grain per acre.	
	1897.	Average 3 years.	1897.	Average 3 years.	1897.	Average 3 years.
	lbs.	lbs.	tons.	tons.	bus.	bus.
Japanese	51.0	45.8	2.87	3.04	28.25	**22.55**
Silver Hull	54.3	50.8	3.24	2.76	30.48	**18.36**
Common Grey	53.8	49.5	3.83	2.76	24.94	**15.71**

The weight per measured bushel and the yield of straw per acre for the four years in which this experiment was conducted are given in the above table. Owing to the fact

that the sparrows ate part of the grain after the buckwheat had been cut in 1896, the yields for that year are not given in the foregoing summary. For three years in succession the Silver Hull variety has given the largest weight per measured bushel, the average for these three years being 50.8 pounds. In the average yield of grain per acre it will be seen that the Japanese variety gave upwards of four bushels per acre more than the Silver Hull, and that the Silver Hull variety gave about two and a half bushels per acre more than the Common Grey.

Beans.

Test of Varieties. As quite large areas are devoted to bean growing for commercial purposes in some parts of Ontario, especially in the western section, we have considered it important to make a thorough test of the principal varieties which are grown in Canada, the United States, and England. Although nine varieties were grown in the experimental department for three years in succession previous to 1897, we thought it advisable to increase that number this season, and consequently secured leading varieties from various sources. The beans were planted on the 10th of June, on plots 1-100 of an acre in size, there being three rows of each variety, four rods in length. Three and one-third links (twenty-six and two-fifths inches) were allowed between the rows. The experiment was a very satisfactory one, and the different varieties had a good opportunity to show their relative merits of productiveness. The different varieties of Horse beans and of Soja beans are not reported in the following table.

Varieties.	Stage of maturity.	Weight per measured bushel.	Yield of grain per acre.
		lbs.	bus.
1 White Wonder	Early	67.38	36.77
2 Burlingame Medium	"	68.00	35.23
3 Medium or Navy	Medium	67.50	33.42
4 Schofield Pea	Early	67.50	31.57
5 Snowflake	"	68.75	31.47
6 Pearce's Improved Tree	"	67.75	31.22
7 Marrowfat	Medium	67.50	30.93
8 Bosion Pea	"	67.00	30.13
9 Great Western	"	66.88	29.80
10 Wisconsin Tree	Early	67.63	29.72
11 Day's Improved Leafless	Medium	66.75	27.95
12 Boston Favorite	"	57.63	27.78
13 Small White Field	Late	67.75	24.38
14 Russian Horticultural	Early	61.75	23.23
15 Buckbee's Electric Tree	Medium	67.13	23.23
16 Early Extra Field	Early	66.88	23.15
17 Dwarf Horticultural	"	62.63	21.80
18 Zeland Haricots	Late	64.38	21.30
19 Eureka	Medium	67.00	20.93
20 Yellow Eye, or "Boston Favorite"	"	64.88	20.50
21 Giant Dwarf Wax	"	57.50	19.82
22 Wilson's Yellow Eye Pea	"	65.75	19.03
23 White Valentine	Early	66.13	18.65
24 Golden Wax	"	63.13	18.52
25 Prolific Dwarf Tree	Late	66.19	17.55
26 Crimson Beauty	Early	59.50	16.90
27 Red Kidney	Medium	59.13	16.30
28 Giant Haricots	Late	51.63	14.48
29 Mexican Tree	"	65.38	12.83
30 Dwarf Kidney	"	61.25	12.72
31 Large White Haricots	"	58.88	12.60

The California pea bean, which stood at the head of the list in the average yield of grain per acre produced by the varieties grown for three years in succession previous to

1897, is not reported for this year, owing to the germination of the seed having been unsatisfactory. It will be observed from the foregoing table that the early varieties of beans gave larger yields per acre than the late varieties in the past season. The Zealand Haricots, Giant Haricots, and large white Haricots, which were reported by an English firm in the spring of 1897 as likely to give excellent results in Canada, have made a rather poor showing in the experiments of 1897. These three varieties were also tested in Kent county this season, and the report shows that they did not give satisfactory results because of their lateness in maturing. These varieties will be tested again next year along with the other varieties, in order to secure the comparative results in different seasons. The experiment of the past year with beans shows the great importance of farm crops being thoroughly tested under Ontario conditions before they are grown extensively. It is very necessary to test carefully all foreign crops, in order to find out whether those varieties which give good satisfaction in other countries will prove to be a success or a failure in this Province.

The reader will notice that eight varieties of beans gave a yield of over thirty bushels per acre in 1897, and also that nineteen varieties produced grain which gave a weight per measured bushel of fully sixty-five pounds.

Test of Seven Varieties Grown for Four Years in Succession.—As seven varieties of beans have been grown in the experimental department for four years in succession, and as we put much stress upon the average results of experiments conducted for a number of years, we give in the following table the average yields per acre and the average weights per measured bushel of these seven varieties for the four years.

Varieties.	Weight per measured bushel.		Yield of grain per acre.	
	1897.	Average four years.	1897.	Average four years.
	lbs.	lbs.	bus.	bus.
Boston Pea	67.0	65.4	30.1	21.0
Medium, or Navy	67.5	65.0	33.4	20.9
Small White Field	67.8	65.5	24.4	19.8
Prolific Dwarf Tree	66.2	65.4	17.6	18.0
Marrowfat	67.5	64.6	30.9	15.4
Yellow Eye, or Boston Favorite	64.9	62.1	20.5	13.3
Giant Dwarf Wax	57.5	54.2	19.8	12.9

There is a little irregularity when the yield of 1897 is compared with the average of four years, as, for instance, the Prolific Dwarf Tree bean gave 17.6 bushels per acre in 1897, and an average of 18 bushels per acre for four years, while the Marrowfat gave a little over 30 bushels per acre in 1897, and yet has a lower average than the Prolific Dwarf Tree bean for four years. Some seasons are somewhat better adapted for certain varieties of crops than for others; hence the great importance of extending an experiment over a number of years, in order to get the average results under varying conditions. Some years the early varieties give the best results, while in others the later kinds make the best returns. These varieties, however, which give the best satisfaction over a number of years are the ones which are likely to give the best all round results in general cultivation.

Grain Sown in Mixtures for the Production of Grain and Straw.

Spring wheat, barley, oats and peas have been grown separately and in various combinations in each of the past five years for the production of grain and straw. The combinations used consisted of six mixtures, with two kinds of grain used in each case; four mixtures with three kinds of grain, and one mixture with four kinds of grain. This made eleven mixtures in all. The four varieties of grain were also grown separately.

These fifteen plots were sown in duplicate in each of the past five years. In 1897 the grain for this experiment was sown on April 24th on plots 1-100 of an acre in size. Thirty plots were used for this experiment in the past season. The land on which the mixtures were sown was comparatively new, having produced only three crops previous to 1897. The following table gives the results of this experiment for 1897, and also for the five years in which this experiment has been conducted.

Mixtures.	Yield of straw per acre.		Yield of grain per acre.	
	1897.	Average 5 years.	1897.	Average 5 years.
	tons.	tons.	lb.	lb.
1. Barley and oats	1.91	1.73	2,119	**2,197**
2. Barley, peas and oats	1.58	1.63	1,900	**2,046**
3. Barley, wheat and oats	1.72	1.66	1,896	**1,971**
4. Barley, peas, wheat and oats	1.72	1.69	1,850	**1,922**
5. Peas and oats	1.74	1.70	1,711	**1,902**
6. Wheat and oats	1.82	1.62	1,980	**1,863**
7. Peas, wheat and oats	1.67	1.69	1,814	**1,797**
8. Barley and peas	1.95	1.48	2,063	**1,687**
9. Barley, peas and wheat	1.85	1.52	2,176	**1,648**
10. Wheat and barley	1.78	1.36	2,083	**1,498**
11. Peas and wheat	1.43	1.36	1,678	**1,335**

As a general rule the oats have more influence in the yield of grain per acre in the various mixtures than any other one class of grain. As the oats were rather light in 1897, in comparison with the other kinds of grain, it will be seen from the yields of grain per acre for 1897 that the three mixtures which usually stand comparatively low have given excellent returns in the experiment for this season. Barley and peas, barley, peas and wheat, and barley and wheat each gave a little more than one ton per acre of grain in 1897. These mixtures also stood quite high in yield of straw. It will be seen however in the last column of figures to the right of the table, that in the average of five years' experiments a mixture of barley and oats has given the largest average return of grain per acre; and a mixture of barley, peas and wheat stands the lowest in this particular. In yield of straw per acre, a mixture of barley and oats has given the greatest returns. When a comparison is made between the different grains grown separately and the same grains grown in mixtures, it is found, in about 90 per cent. of the experiments, that the mixtures produced a larger yield per acre than the same grains grown separately.

Spring Grain—Selection of Seed.

The attention of the reader is directed to the results of the experiments which have been conducted in the experimental department in testing different qualities of seed of the several kinds of farm crops. It is our intention to continue the experiment for several years in order to find out the influence exerted on the crops by a careful selection of seed. The results obtained so far indicate that, to get good crops, good seed must be used.

Barley—Large plump, small plump, shrunken and cracked barley was sown on experimental plots in 1894, 1895, 1896 and 1897. The Mandscheuri barley has been used for this experiment throughout. For the large plump sample, none but well developed grains were selected; for the small plump sample, the grains selected were all of a uniform character; and for the shrunken sample, none but shrunken grains were used—the last selection being made regardless of the size of the kernels. The sample of cracked barley contained nothing but grains which were broken cross-wise, as is frequently done by the

grain separator in threshing. The grain was sown on the 24th of April on plots 1-100 of an acre in size. There was an equal number of grains sown on each plot, namely, 4,125. In the case of the cracked grains, however, the same weight was used as of the large plump.

Selection.	Weight per measured bushel.		Yield per acre.			
			Straw.		Grain.	
	1897.	Average of 4 years.	1897.	Average of 4 years.	1897.	Average of 4 years.
	lbs.	lbs.	tons.	tons.	bus.	bus.
Large plump seed	49.94	48.59	1.93	1.44	59.43	**44.34**
Small plump seed	49.19	47.23	1.86	1.48	55.75	**41.00**
Shrunken seed	49 94	47.53	1.80	1.38	48.74	**37.27**
Cracked seed	48.44	46.75	1.75	1.30	48.76	**34.17**

The results of experiments conducted for four years go to show that the large plump seed produced a larger quantity and a better quality of grain than any of the other selections. The average yield per acre of grain from the large plump seed gave 3⅓ bushels per acre more than that from the small plump seed, 7 bushels per acre acre more than that from the shrunken seed, and 10 bushels per acre more than that from the cracked seed. These results certainly point to the importance of a careful watch in the cleaning of seed barley, as it is not an uncommon thing for some of the grain to be cracked unless the separator is carefully looked after.

Spring Wheat. As in the case of barley, an experiment has also been conducted for five years in succession by making different selections of spring wheat. Large plump seed, small plump, and shrunken seed were selected with great care in each of the five years. The grain was sown upon plots one rod square, and the seeding took place on April 24th. One-half pound of the large plump seed was taken, the grains were carefully counted out, and it was found that there were 7,628 in the half-pound. An equal number of grains of the small plump and also of the shrunken were used.

Selection.	Weight per measured bushel.		Yield per acre.			
			Straw.		Grain.	
	1897.	Average 5 years.	1897.	Average 5 years.	1897.	Average 5 years.
	bs.	lbs.	tons.	tons.	bus.	bus.
Large plump seed	57.63	58.61	2.06	1.35	35.17	**21.71**
Small plump seed	57.00	57.94	2.28	1.19	30.51	**17.83**
Shrunken seed	55.75	52.21	2.15	1.19	29.63	**17.61**

This experiment has been conducted for four years in succession, starting with fresh seed each year, in order to find out as accurately as possible the influence of different selections of seed in the first year's crop. In the average results for four years we find that in yield of grain per acre the small plump seed and the shrunken seed have given results very similar, there being about one-fifth of a bushel per acre in favor of the small plump seed; but from each of these there has been an average of about four bushels

per acre less than from the large plump seed. In weight per measured bushel, and in yield of straw per acre, the large plump seed has given decidedly the best results in the average of the five years' experiments.

White Oats. For four years in succession an experiment has been conducted in which large plump, medium-sized, and small sized grains have been sown on plots of exactly the same size and situated side by side. One-half pound of the large plump seed was selected, the grains were then counted, and it was found that there were 6,659 grains in the half-pound sample. An equal number of the medium-sized grains and also of the small sized grains were then selected from the same variety of oats, the Siberian variety being used in each of the four years. The grain was sown on April 24th, 1897, on plots exactly one rod square.

Selections.	Weight per measured bushel.		Yield per acre.			
			Straw.		Grain.	
	1897.	Average 4 years.	1897.	Average 4 years.	1897.	Average 4 years.
	lbs.	lbs.	tons.	tons.	bus.	
Large seed	31.25	32.26	2.49	1.82	55.91	**51,85**
Medium seed	31.00	31.11	2.40	1.79	61.40	**48.40**
Small seed	29.25	31.43	2.41	1.82	51.01	**40.03**

Large plump seed produced grain which, in the average of four years, has weighed about one pound per measured bushel more than the grain produced by either of the other selections. In yield of grain per acre, it will be noticed that the medium-sized seed gave the largest yield in 1897; but, when the average of the four years is taken into consideration, it will be seen that the large seed produced 3.4 bushels per acre more than the medium seed, and 11.8 bushels per acre more than the small seed.

Sound and Cracked Peas for Seed.

It is a common practice among many pea growers to thresh the crop with the machine. In many cases more or less of the peas are cracked in the process of threshing. This, of course, does not injure the peas for feed; and, in order to obtain definite information regarding the value of the cracked peas for seed, an experiment has been conducted for five years in succession, in which whole peas and cracked peas have been sown upon plots side by side, in order to determine whether or not the cracked peas would give satisfactory results.

Some people have thought that if one half of the pea did not grow the other half would; but we find that by the time the cracked peas reach the seed soil, the germ is usually separated from the rest of the pea. The following table gives the actual results of the experiment for the past five years.

Selections.	Yield of straw per acre.					Yield of grain per acre.					
	1892.	1893.	1895.	1897.	Average 4 years.	1892.	1893.	1894.	1895.	1897.	Average 5 years.
	tons.	tons.	tons.	tons.	tons.	bus.	bus.	bus.	bus.	bus.	bus.
Whole peas	1.54	1.01	1.16	1.63	1.34	25.9	19.8	18 8	48.5	33.5	**29.30**
Cracked peas	.86	.27	.60	.61	.59	12.2	4.4	.8	20.0	11.5	**9.78**

From the above table it will be noticed that in no year did the cracked peas give half so large a yield of grain per acre as was realized by the same weight of sound peas. In the average results for five years, the sound peas gave a yield more than three times as great as that produced by the peas which had been cracked by threshing.

Much interest was taken in this experiment by the farmers who visited the institution when the crops were growing on the land. The experiment of each year formed an excellent object lesson, and many went away apparently convinced that it was advisable to feed the cracked peas and sow nothing but good seed. A few peas might easily be threshed each year either with the flail or with horses, in order to get seed of the proper quality for sowing, and thus prevent a loss of part of the seed and the risk of a poor crop.

Peas—Large and Small Seed.

In an experiment which has been conducted for two years, by sowing large peas and small peas on separate plots, much interest has been taken. Not only have the peas of this selection been sown in the field, but grain of the same selection has been sown in boxes in the experimental building, and the growing crop examined by visitors. When grown in the field plots of an exact size were used, and the same number of peas were sown per plot. It will, of course, be understood that the same variety of peas was used in every instance. The following table gives the results of this experiment for 1897, and also the average results for two years :

Selections.	Weight per measured bushel.		Yield of straw per acre.		Yield of grain per acre.	
	1897.	Average 2 years.	1897.	Average 2 years.	1897.	Average 2 years.
	lbs.	lbs.	tons.	tons.	bush.	bush.
Large peas	60.6	59.5	1.63	1.14	33.5	26.2
Small peas	58.5	58.7	1.48	1.04	38.1	22.6

It will be noticed that in every instance large peas have given better results than small peas. In yield of grain per acre, large seed has produced an average of 3.5 bushels per acre more than the small seed. In 1897, the yield was even more marked, being 5.4 bushels per acre in favor of the large seed. It will also be noticed that large seed produced grain which weighed nearly one pound per measured bushel more than that produced by the small peas.

Seed Peas Injured by the Weevil.

As the ravages of the pea weevil have become very extensive in some parts of Ontario, especially in the western portion, experiments have been conducted to find the value of peas for seed which have been injured by the pea weevil. Although some experimental work has been done in the plots in determining the comparative yields, we give in the following table simply the percentage of germination of the injured peas.

Peas injured by weevil.	Large variety Marrowfat, average 3 tests.	Small variety Golden Vine, average 3 tests.	Average large and small varieties, 6 tests.
Percentage that grew	41	13	27
Percentage that did not grow	59	87	73

As the preceding table gives the results so clearly, but few comments are necessary. It will be observed that in the case of a large variety of peas, like the Marrowfat, about 3-5 of the peas which have been injured by the pea weevil do not germinate. With a small variety of peas, such as the Golden Vine, which is used very extensively in Ontario, the injury is even more marked, as in the average of the three years' experiments only 13 per cent. of the peas which contained the weevil grew. Thus if a person were sowing weevily seed of the Golden Vine variety of peas, it would be necessary to sow about 15 bushels per acre in order to get as many plants as would be produced by two bushels per acre of good sound seed.

Selection of Seed for Four Years in Succession.

In 1894 a careful selection was made of different qualities of seed of barley, spring wheat, and oats. The selections made were sown on plots of exactly the same size which were situated side by side. From the crop produced in 1894 seed was again selected in the same manner and was sown on similar plots in the spring of the following year. From the crops produced from the different selections of seed in 1895, a similar selection was again made in the spring of 1896. The selection was again repeated the next year, and the different selections of seed thus secured were sown upon plots each of which was one rod square. Exactly the same number of grains were used for the plots in the experiment with each class of grain. There were, therefore, 4,125 grains sown on each barley plot, 7,268 grains sown on each spring wheat plot, and 6,659 grains sown on each oat plot in the spring of the present year. As this experiment is specially concerned with the quality of grain produced, a table has been arranged giving the number of grains per ounce in the crop produced from the different selections of barley, spring wheat, and oats in each of the past three years. The smallest number of grains per ounce means, of course, the largest sized grains. The following table does not indicate the exact selection made in the case of oats, as the experiment in this case was with large plump grains, medium-sized grains, and small-sized grains. This fact should be considered when examining the following table.

Selection.	Average number of grains per ounce of crop.								
	Barley.			Spring wheat.			Oats.		
	1895. 2nd yr.	1896. 3rd yr.	1897. 4th yr.	1895. 2nd yr.	1896. 3rd yr.	1897. 4th yr.	1895. 2nd yr.	1896. 3rd yr.	1897. 4th yr.
Large plump.....	600	782	621	958	1,043	949	1,143	1,874	1,309
Small plump..... ..	704	844	724	1,137	1,147	1,112	1,161	1,845	1,292
Shrunken.....	807	897	842	1,161	1,306	997	1,196	1,917	1,434

The reader will notice from the preceding table that in every instance the large plump seed produced the largest seeds, with but two exceptions, these being with oats in 1896 and 1897, when the medium seed produced a little larger grain than the large plump seed With but one exception shrunken seed produced smaller grains than the small plump seed. The exception was that of spring wheat in 1897.

Selection of Seed Oats for Five Years in Succession.

In the years 1883, 1894, 1895, 1896, and 1897, an experiment has been conducted with Joanette oats by selecting large plump well developed seeds; light weighing and light colored seeds; and also seeds from which the hull had been removed by the separ-

ator. The experiment was started in the spring of 1893 by selecting seed from the general crop of the Joanette oats of the previous year. The selection made in each of the following years was from the product of the selected seed of the previous year. The size of the plots used for the experiment was one square rod in every instance. The number of grains used on each plot was carefully counted and an equal number was used of each selection in each of the years in which this experiment has been conducted.

Selection.	Number of grains per ounce, 1897.		Weight of grain per measured bushel.					Yield of grain per acre.			
	Total.	Hulled.	1893.	1894.	1895.	1896.	1897.	1893.	1894.	1896.	1897.
			lbs.	lbs.	lbs.	lbs.	lbs.	bus	bus.	bus.	bus.
Dark plump	1,802	160	32.3	34.5	32.9	27.9	34.8	45.7	67.3	43.4	53.4
Light	1,418	169	30.2	32.8	31.1	24.0	32.4	38.0	50.9	28.7	49.3
Hulled	1,402	185	33.8	34.9	33.4	26.6	33.0	34.4	57.4	41.5	57.9

In the results, which are presented in the tabulated form above, it will be seen that the comparative size of the grains produced in the fifth year from the selection of seed, the comparative weight per measured bushel for the first, second, third, fourth and fifth years of this experiment, and the yield of grain per acre for the first, second, fourth, and fifth years, are given in detail. Owing to some trouble from the sparrows destroying a small amount of grain after it was cut in the summer of 1895, the yields were not given for that year.

On an examination which was made of the comparative size of kernels produced in the crop of 1897, it was found that the light seed produced the smallest grain, the hulled seed the next smallest, and the large plump seed the largest and the heaviest grain. The seed which was hulled by the separator produced good results in yield of grain per acre, but the table shows that there were a greater number of hulled grains from this selection than from any of the others in the crop of 1897. In weight per measured bushel, the large black seed produced a crop in 1897 which weighed 2.4 pounds more than that from the light seed.

At first sight it is a little surprising that the hulled seed produces a larger yield of grain per acre than either of the other selections in 1897, while it gave a less yield per acre than the dark plump seed in each of the other years. It is only well developed seed, having a large kernel and thin hull, that will be hulled in threshing. It will be noticed that in 1896 the quality of oats was exceedingly poor, as the weight per measured bushel was less than 28 pounds in every case. It is quite probable that the oats in that year, which became hulled in the process of threshing, possessed a larger and plumper kernel than those with the hull on and which were selected with the naked eye from the crop produced from the dark plump seed. As the removal of the hull from the oats does not necessarily injure the germinating qualities of the grain, I think it can be easily seen why it would be quite consistent that the hulled grain would produce a larger yield than the other selections in 1897.

Spring Grain—Different Dates of Seeding.

For six years in succession, barley, spring wheat, and oats, and for five years in succession, peas, have been sown on three different dates, beginning on April 21st and ending on May 10th. The experiments were conducted in duplicate in each case. The plots in every instance were 1/100 of an acre in size, and the seeding was done broadcast.

with the hand. The following table gives the average weight per measured bushel, and the yield of straw and grain per acre, for each of the crops for either five or six years, as indicated in the table :

Date of seeding.	Average weight per measured bushel.				Average yield of straw per acre.				Average yield of grain per acre.			
	Barley, 6 years.	Peas, 5 years.	Spring wheat, 6 years.	Oats, 6 years.	Barley, 6 years.	Peas, 5 years.	Spring wheat, 6 years.	Oats, 6 years.	Barley, 6 years.	Peas, 5 years.	Spring wheat, 5 years.	Oats, 5 years.
	lbs.	lbs.	lbs.	lbs.	tons.	tons.	tons.	tons.	bus.	bus.	bus.	bus.
April 21-22	50.08	58.63	59.22	33.04	1.21	1.14	1.14	2.04	40.72	32.75	17.80	**71.95**
May 1-4	48.43	59.90	58.56	31.58	1.20	1.12	1.03	1.85	36.55	31.42	14.40	**63.86**
May 9-10	46.09	60.39	57.61	29.17	1.08	1.04	.87	1.61	28.99	28.46	10.52	**53.48**

As this experiment has extended over a period of five years, the results should be of value in regard to the sowing of the leading kinds of grain at different dates in the spring of the year in a climate somewhat similar to that in which the experiment was conducted. If the results from early sowing appear to be more satisfactory than those from later sowing, by an increase in yield and quantity of grain in the county of Wellington, it is quite likely that the same will hold good in other sections of the Province, although the exact dates may not be the same in all cases. In average weight per measured bushel it will be seen that the barley, spring wheat, and oats produced the heaviest grain from the seeding of the first date ; the second heaviest grain from that of the second dute ; and the lowest from that of the third date. In the case of peas, however, such was not the result ; but exactly the reverse was true. As the season advanced from April 24th to May 10th, the quality of the peas improved.

In the yield of grain per acre, the results are very interesting, as they show decidedly the best returns from the first date of seeding, In the case of peas, however, the yield from the second date is not much in advance of that prodnced from the first date of seeding, and it will be noticed that the grain from the second date averages 1.3 pounds per measured bushel more than that from the first date. Taking all things into consideration, it will be seen that oats, spring wheat, and barley give decidedly the best results from the earliest dates of seeding, while in the case of peas the returns were about equal for the first two dates ; but those for the last date were not quite so good. The reader will observe that there were only about nineteen days between the first and the last date of seeding, but there was a decrease of about twelve bushels of barley, four bushels of peas, seven bushels of spring wheat, and eighteen bushels of oats per acre from the last date of seeding as compared with the first.

Drilling versus Broadcasting. The following is a summary table which gives the average results of sowing peas, wheat, oats, and barley with the grain drill and by hand in each of the past four years. The experiment was conducted in duplicate in each of these years. The plots were 1/100 of an acre in size in every case.

Methods of seeding.	Yield of straw per acre.		Yield of grain per acre.	
	1897.	Average, 4 years.	1897.	Average, 4 years.
	tons.	tons.	bus.	bus.
Broadcasted	1.21	1.59	25.63	**42.37**
Drilled.....	1.24	1.62	27.03	**43.13**

In the average results given in the above table for oats, spring wheat, barley and peas, it will be seen that in yield of grain per acre the drilled seeding gave about three pecks per acre more than that which was sown broadcast with the hand. It should be clearly understood that the land was in a good state of cultivation. Had the soil been in a poor state of cultivation, it is quite likely that the results would have been more marked between the two methods of seeding. In connection with the results of the foregoing summary report, the reader should also study the results of sowing the different classes of grains by the drill, and by hand, on each of six different dates. These results will be found after the variety test of each class of spring grain.

Experiments with Potatoes and Field Roots.

The experiments with potatoes and field roots in 1897 were conducted in the north-western section of the experimental grounds. The land on which the potatoes were situated sloped gently to the north-east, while that occupied by the field roots had a gentle southwesterly slope. The land had a grain crop in 1896, and was manured at the rate of twenty tons of farmyard manure per acre in the spring of 1897, previous to the planting of the potatoes and the sowing of the roots. The ground was plowed in the autumn of 1896, and was thoroughly worked in the spring of the present year. For the variety experiments, the plots were 1-100 of an acre in size; but, for the experiments with different methods of cultivation, the plots varied somewhat, according to the individual experiments. Under the heading of "Roots," experiments were conducted with fall turnips, swede turnips, mangels, sugar beets, carrots, parsnips and kohl-rabi. The number of plots devoted to the root experiments was about equal to that devoted to the experiments with potatoes. The germination of the seed in 1897 was quite satisfactory throughout.

Potatoes.

Fourteen experiments were conducted with potatoes in 1897, and were as follows:

1. Comparative test of 194 varieties.
2. Early varieties most suitable for home use and for market.
3. Depth of planting tubers.
4. Different methods of preparing seed.
5. Selection of seed for four years in succession.
6. Planting sets of different sizes with one eye in each set.
7. Planting sets of equal size having a varying number of eyes in each set.
8. Influence of plaster and lime when sprinkled on freshly cut potatoes for seed.
9. Planting potatoes on the same day as cut and at four days after cutting.
10. Planting single eyes from different parts of seed tubers.
11. Submitting seed to different exposures for three weeks before planting.
12. Methods of cultivation.
13. Treatment for the potato beetle.
14. Application of thirteen kinds of commercial fertilizers for six years in succession.

As several of these experiments have now been conducted for four, five, six and seven years in succession, much valuable information has been obtained. But as our report is to be completed one month earlier than usual this year, it is considered advisable to retain for more complete preparation the results of the experiments with potatoes, which will likely be presented in bulletin form at an early date.

Swede Turnips.

Test of Varieties. In 1897 seventy-nine varieties of Swede turnips were grown in competition in plots in the experimental department. Twenty-nine of these varieties have been grown for seven years in succession, six for six years, eleven for five years, thirteen for four years, five for three years, and nine for two years, and six varieties were grown in 1897 for the first time. Seeding took place on the 20th of June. The seed was sown on the flat in rows 26 2-5 inches apart. The rows were four rods long, and there were three rows of each variety. When the plants reached about two inches in height, they were thinned to a distance of ten inches apart in the rows. The land was cultivated as required until the turnips were too large to allow the cultivation to continue. The land was kept comparatively flat throughout the season.

Varieties.	Results for 1897.			Average results for number of years grown.		
	Yield of tops per acre.	Average weight per root.	Yield of roots per acre.	Yield of tops per acre.	Average weight per root.	Yield of roots per acre.
Grown for seven Years:	tons.	lbs.	tons.	tons.	lbs.	tons.
1 Hartley's Bronze Top	5.40	2.10	23.65	5.92	2.18	**21.11**
2 White Swede	6 30	1.81	19.45	7.21	2.10	**19.88**
3 Skirving's Swede	7.25	1.95	21.90	6.46	2.06	**19.81**
4 Budlong White	3.00	1.80	20.50	4.14	1.77	**19.44**
5 Knowheld	5.05	1.93	20 20	5 61	2.06	**19.41**
6 P. W. & Co.'s Imperial Prize P. T.	6.15	1.82	19.10	6.43	2.12	**19.30**
7 Our Selected Purple Top	4.55	1.69	17.85	5.32	2.07	**19.04**
8 Carter's Imperial Hardy	5.20	1.68	16.90	6.37	2.07	**19.00**
9 Green Top	6.60	1.88	20.75	6.77	2.03	**18.75**
10 Westbury's Improved	5.00	1 65	15.60	6.17	2.04	**18.63**
11 Sharp's Improved	4.50	1.63	15.35	5.64	1.95	**18.59**
12 Hazard's Improved	5.45	2.02	18.20	5.52	2.15	**18.59**
13 Sutton's Champion	4.15	1.77	15.55	5.25	2.10	**18.53**
14 East Lothian	6.00	1.75	19.10	6.08	1.99	**18.28**
15 King of the Swedes	4.50	1.72	19 65	5.67	1.97	**18.24**
16 Highland Prize, P. T	4.80	1.79	18.75	6.74	1.95	**18.18**
17 Carter's Prize Winner	3·15	1.56	11.80	5.76	1.97	**18.13**
18 Hall's Westbury	4.15	1.77	18.55	4.94	1.95	**18.13**
19 Bangholm	3.80	1.87	15.50	5.88	2.05	**18.06**
20 Laing's Improved	5.15	1.82	20.50	5.84	1.87	**17.99**
21 Drummond's Imperial	5.20	1.60	16.55	5.60	1.94	**17.86**
22 Marquis of Lorne, P. T	5.30	2.04	22.15	5.81	1.98	**17.86**
23 White Sweet Russian	5.90	2.06	20.15	6.95	1.88	**17.74**
24 Royal Norfolk, P. T	5.00	1.89	20.45	5.31	1.92	**17.63**
25 Marshall's Purple Top	9.50	1.46	13.95	6.25	2.04	**17.56**
26 Maston's Purple Top	4.00	1.76	18.70	5.53	1.89	**17.48**
27 Carter's Elephant	4.20	1.69	16.00	5.85	1.97	**17.22**
28 White Rock	4.05	1.78	20.15	5.10	1.80	**17.18**
29 Ashcroft's Purple Top	8.90	2.11	14.25	4.71	2.01	**15.24**
Grown for six Years:						
30 Queen of Swedes	5.25	2.36	25.45	5.87	2.06	**20.79**
31 Laidlaw's Improved	5.50	2.47	28.25	5.88	2.02	**30.73**
32 Crimson King	5 20	2.16	25.10	5.98	2.02	**20 08**
33 Shamrock	4.50	2.22	25.30	5.85	2.00	**20.03**
34 Rennie's Prize Purple Top	5.05	2.22	25.75	6.10	2.09	**19.96**
35 Aroostook Ruta Baga	4.25	1.76	20.60	5.84	1.75	**18.03**

SWEDE TURNIPS—*Continued.*

Varieties.	Results for 1897.			Average results for number of years grown.		
	Yield of tops per acre.	Average weight per root.	Yield o roots per acre.	Yield of tops per acre.	Average weight per root.	Yield of roots per acre.
Grown for five Years:	tons.	lbs.	tons.	tons.	lbs.	tons.
36 Kangaroo	4.85	2.27	25.75	6 35	2.21	**22.13**
37 Improved Long Island	4.65	2.51	29.25	5 64	2.15	**21.81**
38 Jarman's Improved King of West P.T	5.65	2.07	22.80	6 56	2.08	**20.32**
39 N. B. & G. Co's. Prize Winner	6.10	2.02	21.20	6.38	2.06	**19.87**
40 Scotch Champion	6 60	1.98	21.15	6.59	1.96	**19.85**
41 Maule's Heavy Cropping	5.25	2.12	24 25	6.06	1.98	**19.73**
42 Bloomsdale	6.25	2.07	22.90	6.64	1.96	**19.48**
43 Jumbo, or Monarch	4 90	1.98	21.50	6.28	1.99	**19.06**
44 Hurst's Monarch	4.50	1.88	21.10	5.86	1.93	**18.65**
45 White French	6.15	2.05	23.90	6.93	1.80	**17.97**
46 Thorp's Improved Shipping	4.55	1.62	18.10	5.25	1.74	**17.18**
Grown for four Years:						
47 Buckbee's Giant	5 00	2.19	23.45	6.58	2.21	**21.31**
48 Dreer's Improved Purple Top	4.20	2.50	27.85	4.61	2.01	**20.52**
49 New American Yellow	5.90	2.08	24.75	6.07	2.02	**19.82**
50 Mammoth Russian	4 15	2.41	27.30	5.33	1.91	**19.81**
51 Halewood's Bronze Top	5.10	2.35	25.25	5.45	1.98	**19.49**
52 Keith's Green Top	4.70	1.98	23.55	6.31	2.03	**19.33**
53 Skirving's Liverpool	4.65	2.26	25.80	6.32	1.98	**19.08**
54 Improved American Purple Top	5.00	1.98	23.10	6.00	1.96	**18.90**
55 Crosse's Improved	5.80	1.88	20.70	6.98	1.81	**17.88**
56 Sweet German	6.10	2.29	25.65	5.68	1.70	**17.43**
57 Burpee's Breadstone	3.15	1.67	19.50	4.97	1.69	**17.11**
58 Burpee's Improved Purple Top	3.55	2.18	24.45	5.54	1.53	**15.85**
59 American Breadstone	3.00	1.92	21.70	3.95	1.56	**15.27**
Grown for three Years:						
60 Simmer's Champion Purple Top	5.35	2.25	25.10	5.88	1.86	**19.57**
61 Perfection Purple Top	4.30	2.18	24.55	5.41	1.88	**19.49**
62 White Giant Purple Top	4.20	2.19	23.40	5.98	1.87	**19 47**
63 Mammoth Siberian	4.20	2.17	23.30	4.80	1.78	**17 75**
64 Pearce's Standard	4.60	1.97	20.05	5.55	1.68	**17.44**
Grown for two Years:						
65 Sutton's Magnum Bonum	4.75	2.28	26.15	6.10	2.26	**24.88**
66 Gloucester White Fleshed G. T	6.65	2.19	25.50	7.58	2.01	**23.73**
67 Improved Purple Top Yellow	4.70	2.03	22.75	5.30	2.16	**23.50**
68 Lord Derby Green Top	5.60	2.13	23.45	5.91	2.07	**22.85**
69 Mammoth Clyde P. T	4.70	2.07	23.70	5.78	1.98	**22 03**
70 Evans' New Ontario P. T	3.80	1.94	22.65	5.28	1.91	**21.75**
71 Evans' Improved Monarch or Elephant	4.80	1.87	21.20	6.30	1.86	**20.43**
72 Sheppard's Golden Globe	4.40	1.74	19.05	5.45	1.75	**19.13**
73 Fettercairn Green Top	5.25	1.83	19.85	7.08	1.79	**19.00**
Grown for one Year:						
74 Vaughan's Improved	4.35	2.01	23.10	4.35	2.01	**23.10**
75 Myer's Purple Top Beauty	3.50	1.94	21.40	3.50	1.94	**21.40**
76 Kinaldie Green Top	4.55	1.86	20.35	4.55	1.86	**20.35**
77 Webb's Giant King	5.05	1.74	17.95	5.05	1.74	**17.95**
78 Dakota Gem	4.35	1.56	16.15	4.35	1.56	**16.15**
79 Vick's Imperial P. T	4.00	1.53	16.05	4.00	1.53	**16.05**

In the table on results of Swede turnips, it will be noticed that the yield of tops per acre, the average weight per root, and the yield of roots per acre, for each of the varieties, are given for 1897, and also for the number of years that the varieties have been grown on the experimental plots. It will be observed that there is quite a variation in the amount of tops produced by Swede turnips of different varieties—for instance, one variety gave as high as nine and one-half tons of tops per acre, while another variety, under similar conditions, gave only three tons per acre. About one-half of the varieties produced roots which averaged over two pounds each in the crop of 1897. The heaviest average roots were produced this year by the Improved Long Island and the Dreer's Improved Purple Top varieties of Swede turnips. These two varieties gave 29.25 and 27.85 tons of roots per acre respectively.

The reader's attention is especially directed to the column of figures at the right hand side of the table, as these give the average yield of roots for the number of years that each variety has been grown in the experimental department. The varieties are mentioned in the list according to their comparative yields, as indicated by the last column referred to. From these figures, it will be seen that the Hartley's Bronze Top heads the list, with an average of 21.1 tons of roots per acre. As there have been twenty-nine varieties tested for seven years in succession, the Hartley's Bronze Top occupief a high place as a large yielder. A few varieties have given an average of only about three-fourths as large a yield per acre as the Hartley's Bronze Top; and the variety standing next to it in yield per acre, has produced about $1\frac{1}{5}$ tons less than the Hartley's Bronze Top in the average of seven years.

Thinning Plants in the Drill. An experiment has been conducted for six years in succession, in which Swede turnips have been thinned to 4, 8, 12, 16 and 20 inches between the plants in the drill. The experiment was conducted in duplicate during each of these years. In 1897, the plots were 1-100 of an acre in size. The soil upon which this experiment was conducted this season was comparatively new, as only three crops had been taken from the land previous to this year, and the soil never received any farm-yard manure or commercial fertilizers. The plants were thinned when about two inches high and were left at the distance required.

Distance between roots in the drill.	Yield of Tops per acre.		Average weight per root.		Yield of Roots per acre.	
	1897.	Average 6 years.	1897.	Average 6 years.	1897.	Average 6 years.
	tons.	tons.	lbs.	lbs.	tons.	tons.
4 inches	2.90	5.62	.53	.77	13.03	**17.26**
8 inches	3.03	5.04	1.03	1.41	13 93	**17.58**
12 inches	2.35	4.66	1.38	1.83	11.28	**15.56**
16 inches	2.23	3.87	1.79	2.31	11.70	**15.35**
20 inches	1.90	3.93	1.85	2.51	9.98	**13.52**

It will be seen from the foregoing results that the crop in 1897 was comparatively light, being about four tons per acre less than the average yields for six years. Although there is not much difference in the average yield of roots per acre produced from the thinnings of four and eight inches, it will be noticed that as the distance increased from eight to twenty inches, the yield gradually decreased. There is an average difference of almost four tons of roots per acre in favor of the eight inch thinnings, as compared with the thinnings of twenty inches. This holds good in the yield of 1897, and also for the average yields of six years. It might be taken as a general conclusion, that as the distance between the plants increased from eight to twenty inches, the average yield per acre decreased, but the average weight per root increased.

Different Distances Between the Drills. An experiment in sowing Swede turnips in drills twenty, twenty-six and thirty-two inches apart was conducted in duplicate in 1892, 1893, 1894, 1896 and 1897. The roots were all thinned to a distance of ten inches apart in the row when they were about three inches in height. The character and prepara

tion of the soil, including manuring, etc., was the same in 1897 as that mentioned in the experiment with the varieties of Swede turnips. The seeding was done on June 28th. There were ten rows in each plot, the rows being two rods in length.

Distance between drills.	Yield of Tops per acre.		Average weight per root.		Yield of Roots per acre.	
	1897.	Average 6 years.	1896.	Average 6 years.	1897.	Average 6 years.
	tons.	tons.	lbs.	lbs.	tons.	tons.
20 inches	4.06	5.15	1.48	1.53	16.29	17.97
26 inches	3.77	4.98	1.74	1.86	16.56	16.89
32 inches	3.82	4.89	2.26	2.10	15.55	15.70

As the soil for this experiment was somewhat different from that used for the experiments of thinning Swede turnips at different distances between the plants in the drill, and as it received a dressing of twenty tons of farmyard manure per acre in the spring of 1897, it will be seen that the yields per acre for this test are about three tons per acre larger than those of the previous experiment. Although the drills twenty-six inches apart gave a slightly larger yield per acre than the drills twenty inches apart in 1897, still, in the average results for six years, we find that the drills standing twenty inches apart gave about one ton per acre more than the drills placed twenty-six inches apart, and over two tons per acre more than those situated thirty-two inches apart.

Fall Turnips.

Test of varieties. In 1897 there were forty-seven varieties of fall turnips grown in the comparative test in the experimental plots. This class of roots is frequently called soft turnips, or white and yellow fleshed turnips. The land upon which this experiment was conducted in 1897 might be termed an average clay loam which produced a grain crop in 1896, and had no manure of any kind since the spring of 1895. The plots were 1-100 of an acre in size. Each plot consisted of three rows, four rods in length, the rows being 3 1-3 links (26 2-5) inches apart. The seed was sown on the flat and the land was kept comparatively level throughout the growing season. When the plants were about two inches high, they were thinned to a distance of about ten inches apart in the drills. At the time of harvesting, they were immediately weighed on being pulled.

In the month of July, 4.8 inches of rain fell, and in August 3 4 inches. These were two very wet months, the land being soaked with water nearly all the time. Hence, it proved to be an unfavorable season for the production of healthy turnips of the fall varieties. Many of the roots were badly decayed. But as the land was very uniform throughout, and as all the varieties were subject to the same detrimental conditions, one of the most interesting and valuable results of the experiment for the past year is the record of the ability of the different varieties to resist the rot. The roots were accurately counted when the plants were partly developed, and before any rot had started. The number of roots which had not rotted at the time of harvesting was again counted, and the percentage of decayed roots was calculated from these notes. This information is given in the left hand column of results in the following table. It will be seen that the Cow Horn, Early American Purple Top, and the Yellow Stone were the only three varieties in which upwards of ninety per cent. of the roots were comparatively sound. In the case of Pomeranian White Globe, Early La Crosse, Yellow Globe, Yellow Aberdeen Purple Top, and Red Globe Norfolk Varieties, the portion of the roots not rotten when harvested was less than twenty per cent. As the rotting of the roots did not naterially influence the average size of the sound roots, good information in regard to the size of the roots of the different varieties is also given. In the following table it will be observed that the Jersey Navet, in the average of seven years' experiments, has produced roots which have given an average of 2.38 pounds apiece.

FALL TURNIPS.—*Continued.*

	Varieties.	Percentage of roots not rotten when crop was harvested.	Average weight per root.	
			1897.	Average for number of years grown.
	Grown for seven Years:		lbs.	lbs.
1	Jersey Navet	72	1.57	2.38
2	Greystone Improved	54	1.45	2.36
3	Purple Top Mammoth	77	1.89	2.35
4	Early American Purple Top	92	1.77	2.22
5	Early Purple Top Munich	37	1.54	2.11
6	Pomeranian White Globe	12	1.41	2.10
7	Red Globe Norfolk	19	1.17	2.07
8	Whitestone	38	1.58	2.05
9	Red Top Strap Leaf	71	1.48	2.00
10	Orange Jelly	20	1.11	1.70
11	Yellow Aberdeen Purple Top	17	1.03	1.51
12	Yellow Aberdeen Green Top	23	.86	1.43
	Grown for six Years:			
13	Imperial Green Globe	57	1.09	1.61
14	Purple Hybrid	41	.90	1.43
	Grown for five Years:			
15	Cow Horn	98	1.98	2.16
16	Jersey Lily	73	1.75	2.09
17	Yellowstone	92	1.94	2.08
18	Green Barrel	63	1.49	1.99
19	Early White Model	65	1.51	1.92
20	Sutton's Imperial Green Globe	61	1.43	1.91
21	White Flat Dutch Strap Leaf	46	1.53	1.86
22	Jarman's Selected Green Globe	53	1.46	1.85
23	White Six-Weeks	68	1.49	1.85
24	Extra Early Milan	26	1.16	1.71
25	Yellow Montgomery	86	1.12	1.70
26	Jarman's Improved Green Top Scotch Yellow	67	.83	1.66
27	Amber Globe	63	.93	1.57
28	Dale's Hybrid	56	1.05	1.49
29	Fosterton Hybrid	52	.85	1.29
30	Carter's Champion Green Top Scotch or Aberdeen Hybrid	40	.81	1.19
31	Seven Top	81	.80	.91
	Grown for four Years:			
32	Milk Globe	74	1.63	2.73
33	White Egg	84	1.59	2.57
34	White Lily	50	1.49	2.11
35	Early La Crosse	16	1.46	2.04
36	All Gold	31	1.30	1.72
37	Orange Sweet	23	1.16	1.57
	Grown for three Years:			
38	Red Top White Globe	81	2.53	2.70
39	Our Selected White Globe	21	1.79	2.00
40	Yellow Globe	17	1.18	1.98
	Grown for two Years:			
41	Long Tankard	34	1.32	1.70
42	Sutton's Favorite Purple Top Yellow Hybrid	35	1.13	1.49
43	Sutton's Perfection Green Top Hybrid	43	1.16	1.45
44	Yellow Finland	29	1.19	1.44
	Grown for one Year:			
45	White Top Strap Leaf	86	1.65	1.65
46	Large White Norfolk	58	1.38	1.38
47	Sutton's Purple Top Scotch	22	1.02	1.02

Thinning Plants in the Drills. This experiment has now been conducted for six years in succession, and consists in growing fall turnips in drills, having the roots thinned to the distances of four, eight, twelve, sixteen, and twenty inches apart. The experiment has been conducted in duplicate in each of the six years. The plots were exactly 1-100 of an acre in size, there being six rows each two rods long in every plot.

Distance between the plants in the drills.	Yield of tops per acre.		Average weight per root.		Yield of roots per acre.	
	1897.	Average 6 years.	1897.	Average 6 years.	1897.	Average 6 years.
	tons.	tons.	lbs.	lbs.	tons.	tons.
4 inches	4.30	7.18	0.62	0.97	16.80	**23.22**
8 inchss	4.25	6.42	1.27	1.74	17.50	**22.70**
12 inches	3.30	6.00	1.58	2.45	14.95	**21.31**
16 inches	2.75	5.84	1.94	3.06	13.80	**20.62**
20 inches	3.25	5.58	2.09	3.36	13.65	**18.80**

The reader will notice the uniformity in the results in the foregoing table. By examining the column which gives the average results for six years, it will be seen that there is a gradual increase or decrease in every instance. In yield of tops per acre, the largest amount was produced from the roots which were four inches apart. In yield per acre of the roots, the highest record was also made by plants situated four inches apart in the drills. There was a gradual decrease in yield as the number of roots became less, until in the case of those which had been thinned to twenty inches apart, the yield was only 18.8 tons per acre. In regard to the average weight of the individual roots, however, it will be seen that the roots having the greatest amount of room were decidedly larger than those situated closer together. The results go to show that both the size of the roots and the yield per acre can be regulated by the distances apart that the plants are allowed to remain on the land. If the farmer has plenty of land and a small amount of help, it might pay him best to grow large roots even if he should obtain a smaller yield. If, however, he has a fair amount of assistance and wishes to crop his land heavily, he will obtain a larger yield of roots per acre, and also a larger percentage of dry matter in the roots, by having them closer together on the land, providing he keeps within the limits of this experiment.

Different Distances Between the Drills. An experiment in sowing fall turnips twenty, twenty-six, and thirty-two inches apart has been conducted for four years in succession. In 1897 the seed for this experiment was sown on land which had not been ridged. The character of the soil, method of cultivation, etc., was similar to that described for the different varieties of Swede turnips. When the plants were about two inches high, they were thinned to a distance of ten inches apart in the drills.

Distance between drills.	Yield of tops per acre.		Average weight per root.		Yield of root per acre.	
	1897.	Average 4 years.	1897.	Average 4 years.	1897.	Average 4 years.
	tons.	tons.	lb.	lb.	tons.	tons.
20 inches	3.74	6.04	1.51	1.94	16.98	**22.88**
26 inches	3.77	5.82	1.81	2.28	16.18	**22.14**
32 inches	3.68	6.07	2.06	2.64	14.42	**20.83**

As can be seen in the foregoing table, the results of this experiment are quite regular. As the distance between the drills increase, the yields of roots per acre decreases, but there is at the same time an increase in the average weight of the individual roots.

Mangels.

Test of Varieties. Sixty-two varieties of the long, intermediate and globe classes of mangels were grown in plots side by side in 1897. Of this number, twenty-seven have been grown for seven years in succession, seven varieties for six years, five varieties for four years, two varieties for three years, and four varieties for two years; and in 1897 six varieties were grown for the first time. The land on which the mangel seed was sown in the past year was quite uniform throughout, and was manured at the rate of twenty tons per acre previous to planting. The soil was plowed in the autumn of 1896, and was thoroughly worked on the surface in the spring of the present year. The seeding of the mangels took place on the 7th day of May, and the germination was very good indeed. The seed was sown on the level and the land was kept comparatively level throughout the season. When the young plants were about three inches in height, they were thinned to a distance of ten inches apart in the drills. There were three rows of each variety four rods in length, and the rows were situated 26 2-5 inches apart, thus making 1-100 of an acre devoted to each variety.

Varieties.	Results for 1897.			Average results for number of years grown.		
	Yield of tops per acre.	Average weight per root	Yield of roots per acre.	Yield of tops per acre.	Average weight per root.	Yield of roots per acre.
Grown for seven Years:	tons	lb.	tons.	tons.	lb.	tons.
1. Evans' Improved Mammoth Saw-leg (long red).	3 40	2 336	27.10	4.26	2.289	25.17
2. Simmer's Improved Mammoth (long red)	4.90	2.681	31.90	4.18	2 234	25.11
3. Steele's Long Red Selected	4 30	2.658	31.50	3.89	2.188	24.25
4. Carter's Champion Yellow Intermedi te	2 50	2.383	28.60	3 01	2.192	23.91
5. Norbitan Giant (long red)	4.75	2.626	60.20	4 00	2.149	23.45
6. Elvetham (long red).	5 10	1.950	23.40	4 31	1.941	22.60
7. Eiffel Tower (long red)	3.95	2.261	26.90	3 61	2 037	22.35
8. Yellow Obendorf (intermediate)	3.10	2.221	25.65	3.01	1.946	22.08
9. Carter's Mammoth Long Red	4.65	2.376	27.80	4 09	2.011	22 08
10. Yellow Oval-shaped Giant	3.50	2.533	30.40	2 21	1 922	21.55
11. May's Mammoth Long Red	5.10	2.576	29 50	4.07	1.911	21.50
12. Oblong Giant (yellow)	3.20	2.493	29.80	2.49	1.916	20.97
13. New Monarch (long red)	4.20	2.357	27.70	3.38	1.823	20 91
14. Colossal Long Red	3.70	1.953	22.75	3.39	1.899	20.71
15. Chirk Castle (long red)	3.70	2.440	28.50	3.19	1.814	20 42
16. Giant Holstein (long red)	6 75	1.957	22.50	3.94	1.857	20.11
17. Mammoth Red (intermediate)	3.10	1.700	20.40	2 92	1.843	19 90
18. Mammoth Golden Giant (yellow intermediate).	2 40	1.972	25.25	2.67	1.687	18.52
19. Red Globe	5.15	2.529	35 10	2.72	1.673	18.29
20. Carter's Warden Orange (oval)	1.60	1.826	21.55	2.47	1 564	17 56
21. Yellow Globe	1.85	1.966	23.10	2.30	1.764	16.70
22. Clark's Devon Orange Globe	3.30	1.982	22.60	2.11	1 535	16.41
23. Golden Tankard	2.20	1.756	20 90	1.87	1.459	16 21
24. Fisher Hobb's Orange Globe	3.55	2.100	25.20	2 08	1.457	15 51
25. Kinver's Yellow Globe	2.15	1.816	22.70	2 01	1.391	15.11
26. Long Yellow	5.00	1.902	22.25	2.57	1 720	15.17
27. Oblong Giant Red	.75	3.000	4.50	1.63	1.886	12.11
Grown for six Years:						
28. Sutton's Mammoth Long Red	6.50	3.084	35.50	3 68	1.781	19.50
29. Canadian Giant (long red)	5.20	2.630	30.90	3.14	1.580	17.24
30. Gate Post (long red).	5.50	2.533	30.65	3 18	1.556	16.78
31. Beck's Champion Globe (yellow)	1.85	1.953	22.85	1.86	1.442	16.15
32. Berkshire Prize Yellow Globe	2.10	1 756	20.90	1.60	1.468	15.88
33. Sutton's Yellow Intermediate	2.20	1.992	24.20	1 57	1.390	15.31
34. Sutton's Golden Tankard	2.25	1 882	22.40	1.88	1,372	14.83

MANGELS.—*Continued.*

Varieties.	Results for 1897.			Average results for number of years grown.		
	Yield of tops per acre.	Average weight per root.	Yield of roots per acre.	Yield of tops per acre.	Average weight per root.	Yield of roots per acre.
Grown for five Years:	tons.	lb.	tons.	tons.	lb.	tons.
35. English Prize (long red)	7.35	3.120	36.50	3.68	1.864	**20.73**
36. Yellow Leviathian (intermediate)	4.75	2 854	34.10	2.75	1.851	**20.34**
37. Giant Yellow Intermediate	3.35	2.311	27.50	2.57	1.798	**19.76**
38. New Eschendorf (yellow oval)	2.90	2.342	28.10	2.09	1.732	**19.28**
39. Ward's Oval (yellow)	2.55	1.939	23.75	2.21	1.684	**19.20**
40. Sutton's Yellow Globe	2.80	2.212	27.10	1.80	1.866	**18.62**
41. Jarman's Giant Long Red	5.60	2.550	30.60	3.29	1 678	**18.52**
42. Jarman's Giant Intermediate (yellow)	2.20	2.244	27.60	1.42	1.697	**18.26**
43. Yellow Ovoid	3 25	2.365	28.50	2.44	1.633	**17.83**
44 Jarman's Selected Golden Tankard	2.50	2.326	26.75	1.82	1.817	**17.29**
45. Jarman's Model Yellow Globe	1.95	2.185	27.75	1.61	1.557	**16.17**
Grown for four Years:						
46. Thorp's Own Yard Long	5.40	2.486	30.95	4.01	1.974	**22.43**
47. Jumbo (long red)	6.50	3.062	36.75	3.85	1.943	**21.93**
48. Carter's Warden Prize Yellow Globe	5.00	2.783	35.90	2.51	1.873	**21.35**
49. Dignity	5 80	2.538	30.20	3 23	1.880	**20.74**
50. Thorp's Own Champion Yellow Intermediate	2.00	2.351	28.45	1.81	1.773	**19.92**
Grown for three Years:						
51. Long White	5.20	2.504	32.05	3.49	2.028	**24.50**
52. Erfurt Model (yellow intermediate)	2.25	1.655	22.10	2.02	1.685	**20.12**
Grown for two Years:						
53. Surprise (long red)	5.05	2.605	31.00	3.48	2.348	**27.00**
54. Cornish Giant Yellow Globe	2.44	2.534	31.55	1.65	1.947	**24 53**
55. Sutton's Crimson Tankard (red)	3.00	2.104	26 50	2.08	1.912	**22.50**
56. Red Tankard	2.45	1.473	19.00	1.63	1.437	**16 93**
Grown for one Year:						
57. New Model	5.45	2.902	35 55	5.45	2.902	**35.55**
58. Taber's Yellow Gate Post	4.75	2.840	35.50	4.75	2 840	**35.50**
59. Riverhall Giant Yellow Globe	3.35	2-855	35.40	3.35	2 855	**35.40**
60. Golden King	3.48	2.618	33.90	3.48	2 618	**33.90**
61. Jersey Queen	1.98	2.504	32.55	1.98	2.504	**32 55**
62. Buckbee's New Mastadon	4.60	2.619	32.35	4.60	2 619	**32.35**

The average weight per root and the yield of tops and roots per acre for 1897, and for the average of the years in which the varieties have been under experiment, are here presented. It will be noticed that the yields for 1897 were good. Several varieties gave upwards of one thousand bushels per acre. Among twenty-seven varieties of mangels which have been grown for seven years in succession it will be seen that the Evans' Improved Mammoth Saw-log stands at the head of the list, with an average of 25.17 tons per acre. This variety is closely followed by Simmers' Improved Mammoth Long Red, with 25.11 tons per acre, which is again closely followed by the Steele's Long Red Selected, with 24.24 tons per acre. The fourth place is occupied, not by a long red variety, but by a yellow intermediate mangel which surpasses a large number of the long red strains of mangels in yield per acre.

Thinning Plants in the Drills. In 1897 the seeding for this experiment took place on May 12th. The land used for this experiment was similar to that used for the experiment with the different varieties of mangels, having received a dressing of 20 tons of farmyard manure per acre in the spring of 1897. The seed was sown on the flat and the

land was kept comparatively level throughout the season. The plots were exactly 1-100 of an acre in size, there being six rows 3⅓ links (26 2-5 inches) apart and two rods long in each plot. The plants were thinned to their respective distances when from two to three inches in height.

Distance between roots in drills.	Yield of tops per acre.		Average weight per root.		Yield of roots per acre.	
	1897.	Average 5 years.	1897.	Average 5 years.	1897.	Average 5 years.
	tons.	tons.	lbs.	lbs.	tons.	tons.
4 inches	5.94	7.38	1.11	1.08	32.21	29.69
8 "	4.30	5 52	2.18	1.90	32.20	28.22
12 "	4 59	5.05	3.30	2.66	33.15	27.45
16 "	5.15	4 83	4 48	3.32	35.70	26.45
20 "	4.23	4.17	5.21	3.80	31 38	23.93

The yields of mangels per acre from the thinnings of different distances between the plants in the drills, were somewhat different in 1897 from the average of the past five years. It will be noticed that the plots in which the mangels were sixteen inches apart in the drills, gave the largest yield of roots per acre in the past season, while in the average results for this experiment it will be seen that the mangels left comparatively close in the drill gave the largest yields per acre; and as the distance between the roots increased the yield per acre decreased, but the average weight of the individual roots increased. While the average yield per acre for five years is a very good one indeed, being about nine hundred bushels per acre, the yield for 1897 is still larger, reaching nearly twelve hundred bushels per acre. The season appeared to be particularly favorable to the roots which had plenty of room for development, as the average weight of the roots which were thinned to twenty inches apart was over five pounds, while that of those four inches apart was only a little over one pound.

Different distances between the drills. The mangel seed for this experiment was sown on May 12th, and the plants were thinned to ten inches apart when from two to three inches high. The preparation and character of the soil was similar to that used in the preceding experiment.

Distance between drills.	Yield of tops per acre.		Averrge weight per root.		Yield of roots per acre.	
	1897.	Average 6 years.	1897.	Average 6 years.	1897.	Average 6 years.
	tons.	tons.	lbs.	lbs.	tons.	tons.
20 inches	4.58	3.72	2.11	1.78	32.84	22.67
26 inches	4.58	3.72	2.72	2.15	32 67	21.38
32 inches	4.39	3.78	3.20	2.52	31.32	20.33

It will be seen from the above table that as the distance increased between the drills the average size of the individual roots also increased, but there was a decrease in total crop of roots per acre in the returns of 1897 and also in the average for six years.

Carrots.

Test of varieties. The plots on which the carrots were grown were twenty links wide by fifty links long, thus being 1-100 of an acre in size. There were six rows of each variety, the rows being two rods in length. Twenty-six and two-fifths inches were

allowed between the rows. The seeding took place on May 10th. When the plants were about three inches in height, they were thinned to an average of four inches apart in the rows.

Varieties.	Results for 1897.			Average results for number of years grown on plots.		
	Yield of tops per acre.	Average weight per root.	Yield of roots per acre.	Yield of tops per acre.	Average weight per root.	Yield of roots per acre.
Grown for six Years:	tons.	ozs.	tons.	tons.	ozs.	tons.
1. Pearce's Improved Half Long (white)	6.50	16.30	29.00	7.11	15 73	29 28
2. Steele Bro's. Improved Short (white)	6.90	16.19	29.30	7.33	15.59	28.88
3. Mastadon (white intermediate)	7.80	17.62	32.60	6.45	14 96	27.95
4. White Green Top Orthe (intermediate)	6.85	15.70	28 60	6.42	14.48	26.62
5. Large White Vosges (intermediate)	5.90	15.91	27.70	5.81	14.05	26.39
6. Simmer's Short White Vosges	8.35	18.12	32.00	5 82	13 95	25.77
7. Sutton's Yellow Intermediate	6.55	14.78	25.50	5 88	13.02	23.68
8. Large White Belgian	7 60	15.94	27.90	5.95	13 25	23.08
9. Giant Wiltshire (long white)	6 90	13.57	23.50	6.43	11.50	2 1.50
10. Danver's Orange (short red)	4.15	12.53	22.35	4.06	10 91	21.33
11. Guerande	4 90	14.20	25.20	3.53	9.72	20.78
12. Mitchell's Perfected (red intermediate)	5.85	13.08	23.10	4.09	10.96	19.47
13. Half Long Stump Rooted (red)	6.05	15.33	28.55	3.22	9.49	18.14
14. Carter's Orange Giant (long)	5.80	11.68	20.95	4.44	11.88	17.55
15. James' Scarlet Intermediate	5.00	10 62	21.05	3.56	8.46	16 06
16. French Intermediate	2.85	6.26	10.60	3 84	7.98	15 20
17. Sutton's Improved Intermediate (red)	4.65	11.44	20.45	3 18	8.35	15 91
18. Yellow Belgian	5.60	11.02	19.90	4.50	8.89	14 43
19. Long Red Surrey	2.40	7.89	15.00	3.82	7.97	14 85
20. Long Orange	6.75	10.73	20.25	5.63	7.91	14.85
21. Improved Long Red Altringham	4.70	9.84	17.00	3.92	7.48	13.18
Grown for five Years:						
22. Rubicon Half Long (red)	5.60	15.00	27.00	3.69	10.43	19.26
23. Chantenay (short red)	6.20	15.70	28.35	3.32	10.78	18.76
24. Nichol's Improved Large Orange	5.75	12.52	23.20	4.12	9.88	18.51
25. Nante's Half Long Stump Rooted (red)	2.70	10.84	20.50	2.82	9 09	17.03
26. Half Long Scarlet	4.30	11.21	20.95	3.45	8.42	16 95
27. Long Red St. Vallery	4.50	11.11	21.35	3.35	9.65	16.87
28. Jarman's Selected Green Top (long red)	6.60	15.00	24.80	3.15	12.83	12.10
29. New Long Red Coreless	1.55	6.30	10.75	1.89	6 05	11.28
Grown for four Years:						
30. Mammoth Intermediate Smooth (white)	6 70	18.55	32.70	5.73	17.38	31.38
31. Iverson's Champion White (intermediate)	7.10	15 35	27 70	6.44	15.98	26.19
32. Improved White Belgian (long)	6.50	13 77	24.70	5.11	12 93	22.1 1
33. Yellow Intermediate	6.75	14.43	23.90	6.49	14.18	21.20
34. Victoria (long red)	7.05	13 94	25 05	4.27	10.40	18.53
35. Midsummer (short red)	3 25	11.04	19.90	2.68	9.95	17.61
36. Yellow Giant	5.45	9 92	17 60	4 09	10.27	16.51
37. Early Half Long Carentian	1.60	6.42	11.60	1.38	5 85	10.96
Grown for three Years:						
38. Thorp's Own Short White	7.00	14.53	26 25	4.90	12.44	21.93
39. Henderson's Intermediate (red)	4.85	10.76	20.85	4.14	10.31	18.42
Grown for two Years:						
40. Carter's Gate Post Orange (long)	9.25	17.24	29 80	6 88	13.77	23.38
41. Intermediate Red	5.35	12.26	23.15	5.08	11.54	21.33
42. Cooper's Yellow Intermediate	7.30	14 90	27.00	6.03	17.66	21 13
43. California Mammoth Orange	4.70	10 17	18.95	4.75	10 22	18.35
Grown for one Year:						
44. Long Yellow Stump Rooted	6.70	16.03	27 70	6.70	16.03	27.70
45. Lobberich's Agricultural	4.60	14.03	25 00	4.60	14 03	25 50
46. Peer of All	5.60	13.47	24.80	5 60	13.47	24.80
47. Buckbee's Majestic	6.80	11.83	21.15	6 80	11.83	21.14

The average yield of carrots per acre is fairly constant one year with another, and the results from the different varieties of carrots at this place is very satisfactory indeed. It will be seen from the results here presented that twenty varieties gave twenty-five tons of roots per acre in 1897, and three of the varieties gave upwards of thirty tons per acre. It will also be noticed that, in the average results for six years in succession, twelve of these varieties have given an average of twenty tons of roots per acre, three of which yielded over twenty-seven tons (900 bush.) per acre.

There are a number of intermediate white carrots which are very similar in general characteristics, and which have given good satisfaction. There is, however, some difference in the yield of those roots which are somewhat similar in general appearance.

Thinning Plants in the drills. An experiment in thinning plants to two, four, six, eight, and ten inches apart in the drill has been conducted in duplicate during each of the past six years. Owing to the unfavorable weather in 1895, the experiment was ruined for the season. We, therefore, have the results for five years to present in this report. The seed was sown on the level surface in rows $3\frac{1}{3}$ links (26 2 5 inches) apart. Each plot consisted of six rows, each two rods in length, thus making 1-100 of an acre in every plot.

Distances between plants in the drills.	Yield of tops per acre.		Average weight per root.		Yield of roots per acre.	
	1897.	Average 5 years.	1897.	Average 5 years.	1897.	Average 5 years.
	tons	tons.	lbs	lbs.	tons.	tons.
2 inches	6.40	7.50	.58	.61	28.18	**28.20**
4 inches	5.20	6.45	.84	.90	24.90	**25.45**
6 inches	5.48	5.50	1.30	1.23	25 55	**22.57**
8 inches	5.48	5.19	1.70	1.44	20 83	**20.46**
10 inches	4.78	5.11	2.01	1.45	18 58	**20.22**

The results of this experiment in growing carrots at different distances between the plants in the drills are very interesting. In the average of five years' experiments, 28 tons per acre were produced from the carrots which were left close together. As the distances between the carrots in the drills increased, the yields per acre decreased, until the limit of ten inches was reached, when the average yield of carrots per acre was 20.2 tons.

Different distances between the drills. In 1897, an experiment was repeated for the sixth time in which carrots were sown in rows of twenty, twenty-six, and thirty-two inches apart. When the plants were two or three inches in height, they were thinned to an average distance of four inches apart. Two rows were used in each plot, the rows being two rods in length. An experiment was conducted in duplicate during each of the six years

Distance between drills.	Yield of tops per acre.		Average weight per root.		Yield of roots per acre.	
	1897.	Average 6 years.	1897.	Average 6 years.	1897.	Average 6 years.
	tons.	tons.	lbs.	lbs.	tons.	tons.
20 inches	6.36	6.03	.77	.77	28.46	**27.85**
26 inches	6.38	5.91	.97	.92	27.70	**26.33**
32 inches	6.36	5.49	1.01	.98	25.03	**22.74**

It will be seen that the drills situated twenty inches apart produced a little over five tons per acre more than those placed thirty-two inches apart, but the average weight of the roots from the close drills was only about ¾ that of the roots grown in the drills farther apart. The results are fairly uniform throughout, but should be considered along with those of the previous experiment, in which carrots were thinned to different distances apart in the drills.

Sugar Beets.

Tests of varieties. Much interest has been taken of late in the growing of sugar beets in Ontario, partly from the standpoint of their qualities for producing sugar, and partly from that of their value for feeding purposes. These varieties have been grown solely for the information of the Ontario farmer, who may desire to grow a quantity for feeding to his stock, and is desirous of securing the best varieties. Eight varieties have been grown for six years in succession, three for four years, and one for two years, and two varieties were grown in 1897 for the first time. The soil on which this experiment was conducted in 1897 was quite similar to that described in the experiment with varieties of mangels. Three rows, each four rods long, were given to each variety. When the plants were about two or three inches in height, they were thinned to an average of eight inches apart.

Varieties.	Color of roots.	Results for 1897.			Average results for number of years grown.		
		Yield of tops per acre.	Average weight per root.	Yield of roots per acre.	Yield of tops per acre.	Average weight per root	Yield of roots per acre.
Grown for six years:		tons.	lbs.	tons.	tons.	lbs.	tons.
1. Lane's Improved	White	6.10	1.88	28.25	3 14	1.46	**19.07**
2. White Silesian	"	6.50	1.69	24.80	5.06	1.55	**18.99**
3. Red Top	Reddish	5.20	1.68	25.00	3.89	1.53	**18.89**
4. Champion	"	3.75	2.02	30.75	3.48	1.47	**18.39**
5. White French	White	7.00	1.36	20 95	4.40	1.39	**16.74**
6. Kleinwanzelben	"	7.75	1.57	22 70	4.97	1.28	**15.49**
7. Red Skinned	Reddish	6.50	1.62	23.20	3.59	1.21	**14.82**
8. Improved Imperial	White	6.60	1.41	20.50	3.96	1.62	**13.11**
Grown for four years:							
9. New Danish Island	Reddish	4.50	1.89	29.20	2.84	1.56	**20.79**
10. Jersey	"	3.90	1.58	23.20	3.23	1.45	**19.37**
11. French Yellow	Yellow	6.40	1.64	24.80	3 72	1.35	**18.20**
Grown for two years:							
12. Green Top White	White	10.20	1.88	27.65	6.75	1.60	**21.44**
Grown for one year:							
13. White	White	7.65	1.76	27.38	7.65	1.76	**27.38**
14. Vilmorin's Improved	"	7.40	1.50	21.60	7.40	1.50	**21.60**

The White Silesian, which has occupied the highest place in average yield per acre, for some years, is now surpassed by Lane's Improved, which has given a slight increase in yield per acre over the White Silesian in the average for six years. It will be noticed that the Lane's Improved gave nearly four tons per acre more than the White Silesian in 1897, hence the change in the order of these two varieties in the table. The Champion and the New Danish Island both gave excellent yields this year.

Parsnips—Comparative Tests of Eleven Varieties.

Up to the present year only four varieties of parsnips were grown in the experimental department in the comparative test for varieties for agricultural purposes. These four varieties were grown in 1897 for the third time; and, besides these, seven varieties were grown this year for the first time. Inquiries have frequently been sent to this department for information regarding parsnips for feeding purposes; we, therefore, felt the need of more information in regard to the various varieties of parsnips as a food for stock, as well as the results given by this class of roots in comparison with the other kinds of farm roots. The soil on which the parsnips were grown in 1897 was quite similar in every respect to that used for the varieties of sugar beets. The plots were 1/100 of an acre in size; and there were three rows, four rods long, in each plot. When the plants were about three inches high, they were thinned to a distance of eight inches apart in the drills.

Varieties.	Yield of tops per acre.		Average weight per root.		Yield of roots per acre.	
	1897.	Average for years grown.	1897.	Average for years grown.	1897.	Average for years grown.
Grown for three years:	tons.	tons.	lbs.	lbs.	tons.	tons.
1. Improved Half Long	3.20	3.12	.81	.83	12.00	**12.56**
2 Improved Long Smooth	5.10	3.65	.93	.77	13.65	**12.18**
3. New Ideal Hollow Crown	2.90	2.79	.86	.78	13.30	**11.77**
4. Magnum Bonum	2.15	2.40	.74	.72	11.30	**10.39**
Grown for one year:						
5. Bloomsdale	4.35	4.35	.96	.96	15.00	**15.00**
6. New Maltese	3.90	3.90	.89	.89	14.95	**14.95**
7. Buckbee's New Sugar	3.25	3.25	.88	.88	13.50	**13.50**
8. Long White Dutch or Sugar	3.30	3.30	.85	.85	12.90	**12.90**
9. French Round	4.40	4.40	.82	.82	12.05	**12.05**
10. Early Short Round	3.55	3.55	.83	.83	11.55	**11.55**
11. Arlington Long Smooth	4.35	4.35	.73	.73	9.75	**9.75**

The Bloomdale variety, which was grown in the experimental department for the first time this year, gave the highest yield of roots per acre, namely, fifteen tons. This, it will be remembered, is considerably lower than many of the varieties of the other classes of roots. As the roots of parsnips penetrate deeply into the ground, the crop is one which is very hard to harvest, requiring much more labor than mangels, turnips or carrots. This is an objection to the growing of this class of roots for feeding purposes.

Kohl-rabi—Comparative Test of Six Varieties.

As Kohl-rabi is sometimes grown for food for stock in some of the older countries, three varieties were tested in the experimental plots in 1896, and six varieties during the present year. The yields in both seasons were quite satisfactory. The root of the Kohl-rabi somewhat resembles that of cabbage, while the leaves closely resemble those of the Swede turnip. The valuable part of plants, however, grows a few inches above the level of the ground in the form of a bulb. Kohl-rabi makes a very nice vegetable for domestic use, and is prepared for culinary purposes in much the same way as Swede turnips. The seed of Kohl-rabi resembles very closely that of Swedish and fall turnips, and the crop is grown in much the same manner as that of the other classes of roots. Plots 1 100 of an acre in size were devoted to each variety.

KOHL-RABI—COMPARATIVE TEST OF SIX VARIETIES.—*Continued.*

Varieties.	Yield of tops per acre.	Average weight per root.	Average yield per acre.
	tons.	lbs.	tons.
1. Large White	4.40	2 45	**36.40**
2. Earliest Erfurt	2.45	1 87	**27.15**
3. Early White Vienna	5 40	2 03	**26.95**
4. Purple Vienna	2.60	1.88	**25.85**
5. Green	3.25	1.99	**25 35**
6. Earliest Green Vienna	2.05	1 80	**23.10**

It will be seen that the Large White variety of Kohl-rabi gave a yield of 36.4 tons per acre in 1897. This is a yield of over 900 bushels per acre, which is certainly very satisfactory. There is a marked difference between the yields of the different varieties, the Earliest Green Vienna producing less than 2-3 and amount of the Large White variety.

MANGELS, CARROTS, SUGAR BEETS, SWEDE TURNIPS, AND FALL TURNIPS SOWN AT DIFFERENT DEPTHS.

An experiment was conducted in 1896 and 1897 with Swede turnips and fall turnips, and in 1897 with mangels, carrots, and sugar beets, by planting the seed one, two, three and four inches deep in the soil. The land used for this experiment in 1897 was similar to that used in the experiment with sugar beets. The seed was placed in the soil with great care; and the yields per acre were determined from the actual yield of the plots.

Depth of planting.	Yield of roots per acre (tons).					Average yield per acre.
	Mangels. 1897.	Carrots. 1897.	Sugar beets. 1897.	Swede turnips. Average 3 years, 1895-6-7.	Fall turnips. Average 2 years, 1896-7.	
1 inch deep	43.45	31.20	37.50	16.47	22 68	**30.26**
2 inches deep	41.55	15.15	28.35	13.08	19.96	**23.62**
3 inches deep	18.00	8.18	10.35	3 68	3.78	**10·00**
4 inches deep	7.28	5.85	1 73	1.40	1.05	**3.46**

The results here presented are very interesting, as they show quite distinctly a marked difference between the results obtained from planting seed of our common field roots at different depths in the soil. In every instance, the seed which was planted one inch deep gave the best result. The advantage of planting one inch deep as compared with planting two inches deep is most marked in the case of carrots and sugar beets. It will be noticed that the carrot seed which was planted but one inch deep gave more than double the yield produced by seed which was planted two inches deep. The seed which was planted four inches deep produced very few plants. It is considered advisable in any experiments of this kind to go even beyond what be met with in ordinary farm work, in order to secure a good general grasp of the subject under experimentation. Even though root seed may never be sown so deeply as four inches, still the experiment shows how the yield in all kinds of roots decreases to a very marked degree as the depth increases beyond two inches, and in some cases even beyond one inch.

Mangels, Carrots, Swede Turnips and Fall Turnips thinned at different stages of their growth.

An experiment was conducted in 1896 for the first time in thinning Swede turnips and fall turnips when the plants were about two inches in height, as compared with thinning them when they had reached the average of eight to ten inches in height. In 1897, however, this experiment was conducted with mangels and carrots. It may be said by some that plants are never allowed to reach eight to ten inches in height before they are thinned; but the writer has on several occasions seen roots thinned when they had reached fully that height. This experiment was conducted on land similar to that previously described for the variety experiment with fall turnips. The plots were 1-100 of an acre in size and the test in every instance was made in duplicate. The plants were carefully thinned in the rows, an equal number being left in each plot. The following table gives the results of each class of roots and also the average returns for the different classes of roots taken together:

Height of plants when thinned.	Yield of roots per acre (tons).				Average yield of roots (tons).
	Mangels, 1897.	Carrots, 1897.	Swede turnips, 1896	Fall turnips, 1896.	
Plants thinned when 1½ to 2 inches high	22 48	14 83	21 10	32 05	**22.62**
" 8 to 10 "	18.18	14 43	16.35	17.95	**16.73**

It will be seen that the plants thinned when young produced a larger yield of roots per acre than those which were not thinned until they reached an average height of from eight to ten inches. The difference in the results of the two dates of thinning is most marked in the case of the turnips, and is least marked in the experiments with carrots. In the average of the four kinds of roots, it will be seen that the plants which were thinned when young gave nearly six tons per acre more than those which were thinned at a later date.

Mangels, Carrots, Swede Turnips and Fall Turnips grown on the flat and on ridges.

This experiment has been conducted for two years in succession with all the classes of roots mentioned in the heading of this report, with the exception of carrots, in which case it was conducted in 1897 for the first time. The experiment was conducted in duplicate during each of the past two years. The land was ridged with a double mould-board plow, the ridges being made to the height of about four inches. The rows were exactly the same distance apart for the flat as for the ridged cultivation, being 26 2-5 inches in both cases. The yields per acre of the duplicate plots were averaged for each year, and the results for 1896 and 1897 averaged in the case of each class.

Method of cultivation.	Yield of roots per acre (tons).				Average yield per acre for all kinds of roots (tons).
	Mangels, 2 years.	Carrots, 1 year.	Swede turnips, 2 years.	Fall turnips, 2 years.	
Flat cultivation	23.30	15.23	13.08	18.38	**17.50**
Ridged cultivation	22.95	14 35	11.89	18.04	**16.81**

In every instance the land which was cultivated on the flat gave a larger yield of roots per acre than the land which was ridged. In the case of fall turnips and mangels, however, the results were not very different, there being about one-third of a ton per acre in favor of the flat cultivation in each class of roots. In the results of the whole experiment, however, it will be noticed that the flat cultivation gave about three-quarters of a ton per acre more than the average realized from the land which was ridged with a double mould-board plow.

Mangels, Carrots, Sugar Beets, Swede Turnips and Fall Turnips grown from different selections of seed.

This experiment has been conducted for three years in succession with mangels and carrots, two years in succesion with Swede turnips and fall turnips, and was conducted in 1897 for the first time with sugar beets. In every instance the seeds of the different sizes were taken from ordinary stocks as sold by leading seedsmen. Large plump seed, medium-sized seed, and small-sized seed was selected from each class of roots mentioned. In selecting the seed great care was taken to use nothing but that which was apparently sound in every respect.

Selections.	Yield of roots per acre (tons).					Average yield per acre for all classes of roots (tons).
	Mangels, average 3 years.	Carrots, average 3 years.	Sugar beets, 1 year.	Swede turnips, average 2 years.	Fall turnips, average 2 years.	
Large plump seed	38.71	30.72	19.72	15.07	23.82	**25.16**
Medium-sized seed	34.74	27.44	20.25	13.66	19 70	**23.15**
Small-sized seed	24.67	20 38	19 05	2.46	10.90	**15.49**

The results of the foregoing table are certainly very suggestive as to the comparative value of the different samples of seed under experiment. In 1896 the results were influenced to a certain extent by the difference of the germination of the seed comprising the different selections, as the smaller seeds did not germinate so well as the larger ones. But as five seeds were dropped wherever it was desired to have one plant growing, it will be seen that a good showing was given to each selection of seed. In 1897, even more pains were taken by placing a larger number of seeds in the soil wherever a root was desired. As a result, we were enabled, by thinning, to have nearly an equal number of roots from the different selections, in order to show the comparative merits of the plants produced by seeds of different sizes. The results show that the large plump seed gave the largest yields and the medium-sized seed the second largest yields in every case, except with the sugar beets in 1897. In this particular instance, it will be noticed that the medium sized seed gave about half a ton per acre more than large plump seed. The results of this test, however, are from only one year's work, and may be looked upon as an exception to the rule as regards the results of the four classes of roots which have been used in this experiment for two and three years in succession.

Swede Turnips and Fall Turnips—Application of Fertilizers.

In both 1896 and 1897, an experiment was conducted in using commercial fertilizers with Swede turnips and fall turnips. The fertilizers used were nitrate of soda, muriate of potash, superphosphate, and a mixture of the three. There was one plot in each set of the experiments which was left without any fertilizers as a basis of comparison. One hundred and sixty pounds of the nitrate of soda, and also of the muriate of potash were used per acre, and three hundred and twenty pounds of the superphosphate. The mix-

ture was composed of these three fertilizers, one-third of the above quantity of each being used. In 1897, the test was made on comparatively new ground from which only three crops previous to this season had been removed. No fertilizers or manures of any kind had been applied to the land previous to this year. One row was left unfertilized between each two plots. The plants were thinned to ten inches apart in the drills.

Fertilizers.	Quantity of fertilizer per acre.	Yield of roots per acre (tons).				Average yield per acre, two classes of roots for 2 years.
		Fall turnips.		Swede turnips.		
		1897.	Average 2 years.	1897.	Average 2 years.	
	lbs.					
1. Mixture	213.3	14.95	20.78	13 18	16.39	**16.33**
2. Nitrate of soda	160.0	13.20	21 55	10.27	15.76	**15.20**
3. Superphosphate	320.0	13 00	19.20	12.18	15.33	**14.93**
4. Muriate of potash	160.0	12.05	19.78	8.88	14.19	**13.73**
5. No fertilizer		12 20	17.78	8.90	13.53	**13.10**

The mixed fertilizers gave over three tons per acre more than the unfertilized plot. The cost of the fertilizer in every case for the amount used per acre would be between $4.00 and $4.50. An increase of three tons of roots per acre was produced, in the case of the mixed fertilizers at a cost of about $4.50, which is equivalent to $1.50 per ton or nearly five cents per bushel.

Silage and Forage Crops.

A number of experiments have been conducted within the past six years, with corn, millet, rape, sunflowers, grasses, clovers, etc. We have conducted some very interesting experiments with several of the classes of crops under this heading, and the results should give valuable and interesting information regarding the comparative value of the different classes of crops, the different varieties in the same class, the special methods of cultivation, the selection of seed, etc. These crops are receiving increased attention year by year by the farmers of Ontario, especially in the cases of corn, rape, and mixed grain for green fodder.

Corn for Fodder, Silage and Grain.

The experiments in 1897 with corn were quite successful and include the following :

1. Comparative test of 173 varieties of sweet, dent, and flint varieties of corn.

2. Comparative test of 17 varieties of sugar cane, kaffir corn, Jerusalem corn, etc.

3. Planting of small, medium, and large varieties at different distances between the drills, and between the plants in the drills.

4. Planting seed taken from different parts of the ear.

5. Planting seed at different depths in the soil.

6. Using seed corn grown in Ontario as compared with seed which was grown farther south.

7. Growing corn from different selections of seed.

8. The comparative value of different kinds of commercial fertilizers for corn.

As this report has to be completed this year one month earlier than usual, it is considered advisable to retain for more complete preparation, the results of the experiments with corn, which results will likely be presented in bulletin form at an early date. As a number of the experiments have been conducted for five and six years in succession, valuable results have been obtained.

Millet—Comparative Test of Eighteen Varieties.

Exactly the same number of varieties of millet were grown in 1897 as in 1896. Three of the varieties, however, which were grown last year were dropped from our list, and three new varieties were introduced this year for the first time. Although seven of the varieties have been grown for six years in succession, it is considered advisable to give no more than three years results, as a number of the leading varieties have been grown for that length of time, and this would place a greater number of varieties under similar conditions, and thus give a better basis for the comparison of results. The plots used in 1897 for the experiments with the different varieties of millet were exactly 1-100 of an acre in size. The seed was sown broadcast and the germination of the different varieties was quite satisfactory. The crop of each variety was cut as it came into head and was weighed immediately after being cut.

Varieties.	Earliness or lateness of crops.	Average height.		Yield of crop per acre when cut.	
		1897.	Average for number of years grown.	1897.	Average for number of years grown.
Grown for Three Years.		ins.	ins.	tons.	tons.
1. Japanese (Crus Galli)	Late	63	40.3	23 1	14.8
2. " (Milleacum)	"	61	42.0	22.0	14 7
3. " (Italicum)	"	46	32.5	19.0	13 6
4. Holy Terror Gold Mine	"	42	34 2	16.6	13.5
5. East India Pearl	Very late.	46	33 3	20 7	13.2
6. Golden Wonder	Late	46	34.0	15.9	12.6
7. German or Golden	Early	38	34.2	12.8	12 5
8. Canadian	"	38	32.3	10.8	10 6
9. Salzer's Dakota	"	43	37.7	12 7	10.3
10. Magic	"	38	32.3	11.1	9.4
11. Hungarian grass	"	40	32.8	13.7	8.9
12. Common	"	41	34.8	11.5	8.1
13. White French	"	40	33.5	11.2	7.8
14. Californian	"	39	31.7	12.4	7.4
15. Red French	"	40	29.2	10 6	7.0
Grown for One Year.					
16. Siberian	Early	38	38.0	13.8	13.8
17. Early Harvest	"	36	36.0	12.8	12.8
18. Hog	"	28	38.0	10.4	10 4

The results here presented show a marked difference in average yield per acre in the fifteen varieties of millet which have been grown in the experimental department for three years in succession. Each of five of the varieties has given an average of over thirteen tons per acre, while each of three varieties has given an average of less than eight tons per acre. The three varieties of Japanese millets which were brought into the United States a few years ago by Prof. Brooks, of the Agricultural College, Amherst, Mass., have given the highest yields among all the different varieties of millets grown. Although the results in the table for 1897 show the yields of these three varieties to be 23.1, 22.0, and 19.0 tons per acre respectively, still the same three varieties, when grown in another section of the experimental field which had been highly manured, gave much better results. The millets grown in 1897, of which the results are recorded in the foregoing table, were sown on land which had never received any manure, and, although the soil is comparatively new, two crops had been removed from the land previous to 1897. The East India Pearl millet which gave a little over twenty tons of green crop per acre in the past season, is an exceedingly late variety, there being nothing but leaves produced

on the plants grown at this institution in each of the past three years. It is a plant suited for a climate much warmer than that of Ontario. The Salzer's Dakota millet now occupies ninth place among the fifteen varieties grown for three years in succession. This variety has been grown in our trial grounds for six years. It gave excellent results for the first two or three seasons, but we find it very difficult indeed, at the present time, to get seed of the same strain of stock as we secured in 1892; hence the results are not equal to those obtained at first. The variety was imported from the State of Minnesota.

Mixed Grains for Green Fodder.

A considerable amount of experimental work has been done in the experimental department in growing different classes of grain in mixtures for fodder purposes. An experiment was conducted in duplicate in 1892, 1893, 1894, 1895, and 1896 by sowing four kinds of grain separately, and in eleven different combinations, thus making use of exactly thirty-two plots for this test for each year. In the average results for five years, it was found that a mixture of peas and oats gave a larger yield of grain per acre than any of the other mixtures. This experiment was not repeated in 1897, but another experiment which had been conducted for five years in succession in growing different quantities of peas and oats per acre was again conducted. An experiment with different varieties of peas and oats for a mixed crop was also conducted in 1897.

Peas and Oats—Different Varieties Grown in Mixtures for Green Fodder.

In 1897, different varieties of peas and oats were sown in mixtures for the production of green fodder. A very careful selection was made with the object of securing a crop that would come early in the season, another that would come somewhat later, and another that would come still later. This experiment was conducted in duplicate on plots which were 1-40 of an acre in size. As these crops showed a good appearance at the time when some fifteen or eighteen thousand farmers visited this institution in the month of June, much interest was taken in examining the growth of the plots. The seeding all took place at the same time, and the crops were harvested when in about the right stage of maturity for using as a green crop, the peas being nearly full size, and the oats in the milk condition. The following table gives the average results of the duplicate experiment for 1897.

Mixtures.	Number of days from seeding time until ready for green fodder.	Yield of hay per acre.	Yield of green fodder per acre.
		Tons.	Tons.
Chancellor peas, 1 bus. per acre Daubeney oats, 2 bus. per acre	76	3.78	10 61
Prussian Blue peas, 1 bus. per acre Siberian oats, 2 bus. per acre	85	4.20	12.17
Oakshott Field peas, 2 bus. per acre Golden Giant oats, 2 bus. per acre	94	4.33	11.06

It will be seen that there is a variation of about eighteen days from the time the earliest crop was ready to feed until the last crop was ready for the same use. The mixture of Prussian Blue peas and Siberian oats, which is intermediate in time of growth, produced the largest amount of green crop per acre, namely 12.17 tons. This mixture has given excellent satisfaction and is one which we can safely recommend for general use.

Peas and Oats Sown in Different Quantities for Green Fodder.

This experiment, which has been conducted in our experimental grounds for six years in succession, occupied eighteen plots in each of these years, as the experiment was conducted in duplicate in every instance. The object has been to ascertain the best quantity of pease and oats to mix for a green fodder crop when the ability of each crop for standing up, and the yield of green feed per acre, are both taken into account. The seed was sown broadcast on plots 1-100 of an acre in size.

Mixtures.	Height of crop. Average 2 years.	Percentage of crop lodged. Average 2 years.	Yield of Green Crop per acre.	
			1897.	Average 6 years.
	ins.		tons.	tons.
Oats 2 bushels, peas 1 bushel	39	2	7.0	8 9
" 2 " " 3 "	39	9	6.8	8.9
" 1½ " " 2 "	40	8	8.1	8.8
" 1 " " 3 "	38	30	7.8	8.6
" 1½ " " 3 "	39	23	7.3	8 6
" 2 " " 2 "	39	5	6.7	8.5
" 1 " " 2 "	88	19	8.6	8.3
" 1½ " " 1 "	39	5	7.3	8.3
" 1 " " 1 "	39	7	7.3	8.1

The reader, when examining the results of the experiment here presented, will have but little difficulty in coming to the conclusion that two bushels of oats and one bushel of peas per acre has formed a mixture which has given very excellent results in the comparative tests of six years. The crop produced by this mixture was but little lodged at the time when the crop was harvested, and the yield per acre was quite satisfactory, giving an average of 8.9 tons. The Prussian Blue Peas mixed with either the Siberian, Banner, or Egyptian oats makes a very good combination for green fodder.

Sunflowers—Comparative Test of Three Varieties.

Seven varieties of sunflowers were tested in the experimental department previous to 1897. As some of these varieties, however, did not give satisfactory results, nearly all of them were dropped from our list, and this year the experiment was with but three varieties, namely, Black Giant, Mammoth Russian, and White Beauty, the two former having been grown in 1897 for the third time and the latter for the first time.

Varieties.	Average results for number of years tested.		
	Height.	Total yield per acre.	Yield of heads per acre.
Grown Three Years:	ins.	tons.	tons.
Black Giant	71.34	11 83	**5.05**
Mammoth Russian	68.17	9.39	**4.26**
Grown One Year:			
White Beauty	67.50	10 60	**4.30**

The Black Giant sunflower has given an average of nearly one ton of heads per acre more than the Mammoth Russian variety. Of all the varieties of sunflowers grown up to the present time, the Black Giant has given the best all round satisfaction, and any who are rowing the "Robertson Combination" might do well to give the Black Giant a trial, as the heads form the part used for cutting and mixing with corn in the silo.

Fodder Crops.

Seven kinds of fodder crops have been grown under experiment for three years in succession. This experiment is an interesting one, as several of the crops regarding which much has been said of late, are included in the comparative test. The plots were 1-100 of an acre in size in every case. The crops were harvested when in about the right condition for feeding purposes, and were weighed immediately on being cut; therefore, the results given below represent the yields of green crop per acre:

Varieties.	Average height of crop.		Average yield per acre.	
	1897.	Average 3 years.	1897.	Average 3 years.
	ins.	ins.	tons.	tons.
Dwarf Essex Rape	44	28.2	36 80	24.05
Grass Pease	56	46.3	8.25	8.
Egyptian Pease	16	17.1	6.10	8.75
Yellow Soya Beans	31	26.3	7.90	8.67
Crimson Clover	24	15.7	12.50	8.56
Prussian Blue Pease	65	54.9	5.10	6.85
Horse Beans	28	29.7	1.00	4.25

It will be seen that the Dwarf Essex rape gave a very large yield in 1897, namely, 36.8 tons per acre. This was certainly a magnificent crop, and was admired by visiting farmers who examined the crops on our trial grounds in the autumn. The crimson clover was also an excellent crop this year, but during the past five years has not proven to be a very satisfactory crop for either hay or green fodder. The horse beans have not given very satisfactory results in any of the experiments, as they are apt to turn black before they get their full growth, and it is necessary to cut the crop at an early stage in order to prevent further deterioration.

Varieties of Rape, Kale, etc

In each of the past two years, a very interesting experiment has been made by sowing different varieties of rape, kale and similar crops upon plots of uniform size to obtain information regarding the yield of these crops. The plots were 1-100 of an acre in size in every instance. The crop from each variety was weighed immediately on being cut.

Varieties.	Average height, 1897.	Yield of green crop per acre.	
		Average 2 years.	1897.
	inches.	tons.	tons.
Cow cabbage or Marrow Stem kale	42	.....	39.27
Dwarf Essex rape	44	30.69	37.20
Victoria rape	38	25.50	32.40
Thousand Headed kale	36	21.74	27.87
Tall Jersey cabbage	45	.....	27.60
Large tall French Brussels Sprouts	22	15.48	28.00
Tall green curled Scotch kale	11	14.02	14.53

The seed of the Cow cabbage which was secured from Montreal, and that of the tall Jersey cabbage which was obtained from Jersey Island, were grown in 1897 for the first time. It will be seen that in the crop of the past year, the Cow cabbage, or Marrow Stem kale, produced the largest yield per acre, namely, 39.27 tons, which was closely followed by the Dwarf Essex rape with 37.2 tons. The Victoria rape and the Dwarf Essex variety have been grown in our trial grounds for several years in succession. We find that the Dwarf Essex has given a larger yield per acre than the Victoria rape in every year of the experiment. The tall Jersey cabbage is used extensively on the Island of Jersey, and Prof. H. H. Dean of this institution, when visiting the Island of Jersey in 1895, observed that this special variety was in general use and was very highly prized. The growth this year in our grounds was good, even though the yield per acre was not quite so high as that of some of the other varieties here reported. Experiments with these crops will likely be conducted for several years, in order to get thoroughly reliable information in regard to their respective merits. As one of the College associates, Mr. W. E. Butler, is writing his thesis on the results of an experiment which he is carrying on by feeding these different crops to dairy animals and observing carefully the influence of each variety upon the dairy products, some interesting information should be obtained from his investigation.

Rape—Selection of Seed.

As in the case with nearly all farm crops, an experiment has been conducted with rape, in planting different-sized seed, to find out which will produce the most satisfactory results. The experiment has been conducted for three years in succession by selecting large plump seed, medium-sized seed and small-sized seed from the ordinary stocks of seeds as sold by leading seedsmen. The seed in all cases was sound and whole, and was carefully sifted and hand picked to make the samples as required for the three separate classes. The experiment was conducted in duplicate each year. The following table gives the result of the experiment for 1897 and of the average of two years in which this experiment has been conducted.

Selections.	Yield of green rape per acre.	
	1897.	Average 3 years, 1895-6 7.
	tons.	tons.
Large plump seed	17.7	**19.45**
Medium sized seed	16.1	**17.27**
Small sound seed	14.2	**14.65**

The results from this experiment in 1897 were quite similar to those of the two years previous. The average results showed that the large plump seed produced a crop of about two tons per acre more than that produced from the medium-sized seed, and about five tons per acre more than that from the small seed.

Rape—Application of Fertilizers.

In 1891, 1896 and 1897 an experiment was conducted by using different fertilizers with rape, in order to find out which gives the best results and whether any of them would furnish a sufficient increase in crop to pay for the fertilizer used. The plots were 1-100 of an acre in size in the experiments in the past year. The fertilizers were applied at the time the rape seed was sown. The mixed fertilizer consisted of nitrate of soda,

superphosphate and muriate of potash in quantities one-third of the amount used when these fertilizers were sown separately. The mixture, therefore, would be a complete fertilizer containing nitrogen, phosphoric acid and potash.

Fertilizers.	Amount of fertilizer used per acre.	Yield of green rape per acre.			
		1891.	1896.	1897.	Average 3 years.
	lb.	tons.	tons.	tons.	tons.
Nitrate of soda	160	15 8	14.7	14.0	14.8
Mixture (complete)	313	14.8	10.6	15.6	13.7
Superphosphate	220	12.6	10.4	13.8	12.3
Muriate of potash	160	12.2	10.4	12.7	11.8
No fertilizer		13 2	10.2	11.3	11.6

It will be observed that the nitrate of soda produced the largest results in 1891 and in 1896, and the second largest in 1897. In the average results for the three years it will be seen that the nitrate of soda produced a little over three tons per acre more than the unfertilized plot, while muriate of potash produced nearly 1-5 of a ton per acre more than where no fertilizer was used. For five years in succession rape has been grown with nitrate of soda and without any fertilizers in the co-operative experiments conducted throughout Ontario. The nitrate of soda has given a larger average yield per acre than the plot which was left unfertilized in each of the five years by about 2.1 tons of crop per acre. The fertilizers used in connection with the test conducted in the experimental department has cost from $2 to $2.25 per acre in each instance for the amount used.

Clovers—Comparative Test of Varieties.

In each of the past two years, reports have been given regarding eight varieties of clovers tested in the experimental grounds. We will be able in another year or so to present a report of a number of varieties under similar conditions, but for 1897 we give the returns of only lucerne and sainfoin, as it is necessary to have fresh plots sown with the other varieties of clover in order to get results under uniform conditions. The seeding of the lucerne and of the sainfoin took place on May 12th, 1894. No protection has been afforded the plots in any of the past winters. The following table gives the results of the experiment with this crop for 1896 and 1897.

Varieties.	Yield of green crop per acre.		
	1896.	1897.	Average 2 years.
	tons.	tons.	tons.
Lucerne or Alfalfa	19.88	23.96	21.92
Sainfoin	11.70	18.16	14.93

As the spring of 1896 opened up very early, we were enabled to get four crops of lucerne in that year; but, as the growth was later in starting in the spring of 1897, but three crops were obtained from the land during the summer. Owing to the heavy rains in the months of July and August, the lucerne grew abundantly, and although only three cuttings were made, still it will be seen that the total yield per acre in 1897 was

larger than that of 1896. Lucerne we find to be an excellent crop for green-fodder and for mixing with grasses and other clovers for a permanent pasture. For hay, however, much care is required in cutting lucerne at the right time, and in preventing its becoming too dry under the hot rays of the sun. If the crop is allowed to stand too long before being cut, the stems become fibrous and of a poor quality. If lucerne is properly handled, however, it produces a large amount of hay of a fair quality. Sainfoin is used particularly as a green fodder plant, but the stems are apt to become much larger and coarser than those of lucerne. The crop does not grow so rapidly, and there are not so many cuttings in one season. All things taken into consideration, lucerne has given better all round satisfaction than sainfoin. For information regarding crimson and other kinds of clover, the reader is referred to the reports of 1895 and 1896.

Grasses—Comparative Test of Twenty Varieties.

Thirty-one varieties of grasses were sown in the experimental grounds on the 15th of May, 1894. Several of the varieties were completely killed out during the first winter. Twenty varieties, however, have now passed through three winters, and the crops are still quite uniform over the ground in most instances. The plots are each exactly 1-100 of an acre in size.

Names of varieties of grasses.		Uniformity of crops, 1897.	Average height of crops 3 years.	Yield of green crops per acre.	
Common name.	Scientific name.			1897.	Average 3 years, 1895-6-7.
			ins.	tons.	tons.
Lyme Grass	Elymus Virginicus	Medium	27	7.04	7.51
Fringed Brome Grass	Bromus ciliatus	Medium to good	30	9.44	7.15
Western Rye Grass	Agropyrum tenerum	Medium	24	5.76	6.92
Bearded Wheat Grass	Agropyrum caninum	Medium to good	27	5.12	5.31
American Brome Grass	Elymus Americanus	Medium	20	5.60	4.95
Tall Oat Grass	Arrhenatherum avenaceum	Good	41	6.16	4.91
Orchard Grass	Dactylis glomerata	Medium to good	30	5.12	4.67
Timothy	Phleum pratense	Good	33	4.72	4.13
Awnless Brome Grass	Bromus inermis	Medium	21	4.80	3 45
Soft Brome Grass	Bromus Mollis	Good	31	3.92	3.31
Meadow Fescue	Festuca elatior	Good	28	3.20	3.31
Meadow Foxtail	Alopecurus pratensis	Medium to good	29	4.64	3.16
Rhode Island Bent	Agrostis canina	Good	22	2.80	2.23
Canadian Blue	Poa compressa	Extra good	16	3.52	2.20
Red Top	Agrostis vulgaris	Good	20	2.14	2 07
Perennial Rye	Lolium perenne	Good	18	2.16	1.73
Yellow Oat	Avena flavescens	Good	23	2.56	1.68
Creeping Bent	Agrostis stolonifera	Medium	14	2.36	1.53
Kentucky Blue	Poa pratensis	Good	21	1.36	1.37
Fine-leaved Sheep's Fescue	Festuca ovina	Medium	16	1.20	.85

The five varieties which stand at the head of the list in average yield of green grass per acre for three years, were imported from Manitoba. Although the growth of most of these varieties is somewhat coarse, still the yields in some instances are very large. The Tall Oat Grass, Orchard Grass, and Timothy have all made very good records.

Permanent Pasture.

Within the past twenty years, a considerable amount of experimental work has been done in testing varieties of grasses and clovers both singly and in combination. When the varieties have been grown alone, they have been allowed to remain in the land for several years, providing they have been hardy enough to stand the climate of Ontario. These grasses and clover have been carefully studied, and much information has been gleaned in regard to their usefulness for pasture and for hay. In 1885 Prof.

Brown recommended a mixture which he considered to be well adapted for a permanent pasture. Only the most hardy varieties which had been tested up to that time were included in that mixture. In 1893, after eight years' additional experimental work, during which time the writer was closely connected with the work of the experimental department, we recommended another mixture containing a less number of varieties and requiring a smaller amount of seed per acre. The grasses and clovers recommended in 1893 have proven themselves to be very suitable for a permanent pasture. They are all hardy varieties and when grown together give a large yield. An experiment was started in the spring of 1894 by sowing a plot of the mixture which was recommended in 1885, and another plot of the mixture which was recommended in 1893. The seed was sown with a light seeding of barley, and the germination of the seed of the grasses and clover was quite satisfactory. The following table gives the results from these two mixtures for the past three years:

Mixture recommended in	Grasses and clovers.	Varieties in mixtures.	Amount of seed per acre.	Average height of first cutting.	Yield of freshly cut grass per acre.	
				Average 3 years.	1897-2 cuttings	3 years 1895-6-7. 7 cuttings.
			lbs.	ins.	tons.	tons.
1885	Grasses	Meadow Fescue	6	30	16.64	15 87
	"	Meadow Foxtail	3			
	"	English Rye	2			
	"	Timothy	3			
	"	Canadian Blue	4			
	"	Orchard	3			
	"	Red Top	2			
	"	Yellow Oat	2			
	Clovers	Lucerne	4			
	"	White	2			
	"	Alsike	2			
	"	Red	1			
	"	Yellow	1			
		Total amount seed used	35			
1893	Grasses	Orchard	4	32	18.80	19.36
	"	Meadow Fescue	4			
	"	Tall Oat	3			
	"	Timothy	2			
	"	Meadow Foxtail	2			
	Clovers	Lucerne	5			
	"	Alsike	2			
	"	White or Dutch	1			
	"	Yellow or Trefoil	1			
		Total amount seed used	24			

There were two cuttings made from each plot in 1895, three in 1896, and two in 1897. Without a single exception, the mixture which was recommended in 1893 has produced the largest yield per acre. This mixture should be well adapted for good pasture soil. We have named all the varieties and clovers required for the mixture, and also the quantity of seed per acre, particularly, for two reasons: In the first place, that this experiment might thus be made as clear as possible; and, secondly, that any person wishing to know the quantity of seed per acre of the different varieties which are recommended as a permanent pasture mixture, would be enabled to find the information in good form

Co-operative Experimental Work.

One of the most extensive systems of co-operative experimental work in agriculture to be found at the present time is the one established in Ontario. During the past year we distributed 11,497 packages of grains, seeds, and fertilizers to Ontario farmers. The varieties thus distributed were those which had given the best results in a number of years' trials in our experimental department. The whole system of co-operative experimental work is conducted in close connection and in perfect harmony with our experimental work at the College. The two go hand in hand, each being made very much better by the assistance of the other. This work has increased year by year since it was started in 1886; and during the past four years the demand has been so great that we have been unable to supply material to the full number of applicants. In 1891 there were 2,642 plots; in 1892, 5,688; in 1893, 7,181; in 1894, 7,721; in 1895, 9,179; in 1896, 11,124; and in 1897, 11,497 used for these co-operative tests over Ontario.

This co-operative experimental work is conducted conjointly by the experimental department of the Ontario Agricultural College and the Ontario Agricultural and Experimental Union.

The Union opens up a channel through which the best material of the Experiment Farm can be brought to the homes of the farmers; it makes direct application of the information gained at the experimental farm by having experiments conducted upon hundreds of farms; and it systematizes the co-operative work in such a way that the results can be summarized and made into valuable reports for the guidance of farmers generally. The influence of the Union is potent in bringing the Agricultural College into closer touch with the farmers, in fostering kindly feelings between the graduates and their Alma Mater, and in awakening wholesome lines of thought and observation in the minds of those engaged in the various branches of agriculture.

Nearly all of the eighteen different experiments carried on throughout Ontario during the past year were carefully conducted in the experimental department at the College in 1897. These experiments were made at the College in accordance with the printed instructions which were sent out to all co-operative experimenters. The results of these tests are not included in this report, but will be embodied with those of the other co-operative experiments for presentation at the annual meeting of the Experimental Union.

Miscellaneous Crops.

Besides the systematic experiments which have been reported upon in the foregoing table, there were quite a number of minor experiments, the result of which cannot be placed in tabulated form to advantage. Under this heading might be mentioned experiments with flax, hemp, pea-nuts, ground almonds, horse beans, soja beans, tares, winter rye, winter barley, Speltz spring wheat, sand buckwheat, prickly comfrey, sachaline, flat pea (*Lathyrus Sylvestrus*), collards, teosinte, ramie, Australian salt bush, lupines, lentils, banana field beans, cow peas, sweet clover, chicory, field pumpkins, and field squashes. Besides the tests made with these different crops other experiments were conducted in growing a number of fodder crops late in the season with and without manure; in the use of nitrogin with peas, red clover, horse beans, lupines, and serradella; in growing green crops o plowing under; in the separate seeding of three varieties of grasses and four varieties of clovers with and without a grain crop in the autumn and also in the spring; in the growing of rape, crimson clover, etc., with oats; in preparing land differently for sowing spring grain; in the seeding of lucerne with and without a grain crop, and with and without an application of farmyard manure; and in the seeding of clovers and grasses in twenty-one different combinations in the spring of 1897. For the results of

the experiments of a few of the crops here mentioned, the reader is referred to the report of the Agricultural College for 1896. Further details of the results of the experiments with these miscelllaneous crops, methods of seeding, etc., will probably be given in the report of 1898, when another year's experience with each of them will be secured.

Crops for Experiments in Feeding.

Several crops were grown in 1897 in order that Mr. G. E. Day, our Agriculturist, could conduct a practical experiment in feeding dairy cows. The experiment consisted in determining the comparative feeding qualities of winter rye and of lucerne as a green fodder in early summer; of oats and peas and of oats and tares as a green fodder in late summer: of dent corn and of sweet corn as a green crop in autumn; and of mangels and sugar beets as food in winter. For the results of the feeding experiments, the reader is referred to the report of the Agriculturist.

Conclusions.

The experimental department was never so well equipped for good work as it is at the present time. The plots, which now number upwards of 2,000, were admired by the thousands of farmers who visited our College during the past summer. Seedsmen, fertilizer manufacturers, agricultural editors, and farmers generally have shown much interest in our work of experimentation. The students in attendance at the College have had an opportunity of examining the various crops under investigation, and have thereby received information which should be of great service to them when engaged in farming at their own homes. We have aimed to make our work practical, accurate, and reliable, and ask for the advice and the support of the farmers of Ontario in the further prosecution of this work.

Mr. Jas. Atkinson, B. S. A., who was with me in the early part of the season, resigned his position here to accept a more remunerative one in connection with the Agricultural College of the State of Iowa.

In conclusion, allow me to thank you, and through you, the Minister of Agriculture, for the able support you have given me in advancing the work of this department.

Respectfully submitted,

C. A. ZAVITZ,
Experimentalist.

Ontario Agricultural College,
Guelph, Nov. 30th, 1897.

FILLING THE DAIRY SILO AT O. A. C., GUELPH.

PART XI.

REPORT OF THE FARM SUPERINTENDENT.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to submit herewith my annual report for the year 1897. Notwithstanding the protracted extremes of wet and dry weather during the past season, we had more than an average crop of most farm products.

IMPROVEMENTS. The re-painting of farm buildings commenced last season, was continued by giving the barn, sheep-pen, and piggery two coats each; the fence posts around the farm were also painted. The composition mentioned in the last report was used again. The lane has been gravelled from the buildings north to the woods, eighty rods; and the grading continued through the swamp land to the north field, 115 rods. This uncultivated portion of the farm, consisting of twelve acres, is being drained and stumped as time will permit.

ROTATION OF CROPS. Four years ago it was decided to follow a systematic rotation of crops (a four years' course), viz.: Two years, grass, meadow and pasture, 180 acres; third year, corn, roots and peas, 90 acres; fourth year, grain and seeded down, 90 acres. As no system of rotation had been pursued in former years, some portions of the farm were lacking in vegetable matter, caused by growing grain crops for several successive years. The fertility of those parts has been restored by growing clover and plowing under the second growth every second or third year; and the whole farm is now in a good state of fertility. The changed appearance of the soil is quite noticeable, being now of a dark color, which shows that there is an abundance of humus, *i. e.*, decayed vegetable matter, present. Under this system, any farm should increase in fertility without the use of any fertilizer except the barnyard manure which is made on the farm.

MEADOW. We had ninety-seven acres of meadow, which averaged fully two and a half tons per acre. Seven pounds red clover, three pounds alsike, and four pounds timothy were sown per acre. The larger proportion of red clover was used because it is more valuable for fodder and as a fertilizer than the grasses. The extreme wet weather made it difficult to cure so large a quantity of clover; but by the use of the hay tedder we were able to put it in cocks soon after it was cut, and by this means the whole crop was fairly well saved. We commenced cutting on June 23rd, and on the 29th wet weather set in, which continued until the end of August, and caused a large amount of extra labor during haying and harvest.

PASTURE. There were forty acres in pasture, besides the wood lands, which were equally divided between the Dairy Department and the Farm.

FALL WHEAT. Twenty acres of fall wheat were grown—twelve acres of Dawson's Golden Chaff, and eight acres of Early Genesee Giant. Both varieties yielded about forty bushels per acre, and a very heavy crop of straw, which was, however, badly lodged. Cutting was begun on July 21st, and finished on the 26th. There were showers nearly every day and for a week after, which gave much extra labor to prevent the grain from

sprouting. According to our rotation, fall wheat follows peas; and before the peas were sown in the spring the land received a dressing of coarse barnyard manure, about fifteen loads per acre. This was gang-plowed lightly and mixed with the surface soil before sowing the peas. After harvesting the peas, the land was again gang-plowed and thoroughly cultivated before sowing the fall wheat, which was done the last week in August at the rate one and a half bushels per acre.

Spring Wheat. Fifteen acres of Herison Bearded were grown, ten acres on root land and five acres on sod. Under both conditions it had the same unhealthy appearance as last year; and, though there was an abundance of straw, the grain did not mature properly. I believe it would be advisable to stop growing spring wheat in this section for one or two years.

Oats. The north section of the farm, formerly known as fields Nos. 19, 20, and 21, containing fifty-five acres under cultivation, was sod in 1896. It was plowed early in the fall and was thoroughly cultivated, and was sown with Siberian oats last spring and seeded down with the usual mixture; so it will now come in the regular rotation. One and a half bushels per acre were sown, which yielded a very heavy crop, a portion of which was so badly lodged that it had to be cut with the mower.

Barley. Fifteen acres of Oderbrucker barley were grown on root land which had simply been cultivated and drilled the previous fall. The barley was sown on April 21st, and made a remarkable growth; so much so that it had to be cut with a mowing machine and hauled in loose. Twenty acres of Mandscheuri barley were grown after corn which had been cultivated and drilled the fall before. This also yielded a large crop, but this variety, having a stiffer straw, was cut with the self-binder.

In places where the crops were badly lodged they smothered out the young grass, which was resown by hand immediately after harvest, so that there will be no blanks.

Peas. Twenty-four acres of peas (Prussian Blue) were sown. On account of wet weather, the crop was not equal to those of the two preceding years, which yielded over thirty-five bushels per acre. As soon as the peas were harvested, the land was gang-plowed, harrowed, and thoroughly pulverized with the disc-cultivators, for fall wheat, which was sown 30th and 31st August. Although only one and a quarter bushels per acre were sown and September was exceptionally dry, the wheat grew luxuriantly and soon covered the ground. As a portion of the grain sown was sprouted, according to test, only about one bushel per acre grew, which is quite sufficient on land properly prepared.

Corn. Thirty-three acres of ensilage corn were grown, as follows: Fifteen acres Mammoth Cuban, eight acres Wisconsin Earliest White Dent, eight acres Compton's Early, and two acres Black Hills, the latter a new variety which did not prove equal to the others. On account of the cold and wet weather in the end of May, a large portion of the corn planted on the 17th, 18th, and 19th did not germinate, so the land was again cultivated and replanted June 6th, 7th, and 8th, which is rather late for this section, as we are liable to get frosts in September before the corn is sufficiently matured to cut and put into the silo. Though there was no rain for three weeks after this second planting, the corn grew very rapidly and yielded an average crop of twenty tons per acre. We commenced cutting and filling the silo September 18th; the previous night there were two degrees of frost and the following Monday night four degrees, after which the leaves became quite dry and had a bleached appearance.

I do not consider this ensilage equal to that made from corn matured without being frosted. After filling both silos to their utmost capacity, the balance, about 150 tons, was set up against the fence for present use, about one ton a day being cut and fed to cattle and horses. The corn was sown with the ordinary grain drill in rows forty-two inches apart; fourteen pounds of seed per acre was used. The horse weeder was kept going both before and after the corn came up, to keep the surface soil thoroughly pulverized. After the corn was up several inches, we used the two horse cultivator, repeating three times until the corn was two or three feet high. Very little hand hoeing is required, if the land has been thoroughly cultivated the previous fall.

Rape. Six acres of rape were grown—one acre sown May 22nd, to feed lambs after weaning in July; the remainder on June 19th and 21st, for fall and early winter feeding. It is principally used for fattening steers. During October a cartload was taken each day to the pasture field; and during November and December to the stable, and left in the passage about a day to thaw out before feeding. About November 20th, the rape was cut with a scythe and put in heaps where it will remain frozen until brought into the stable. Rape fed with ensilage and clover hay for producing beef gives the very best results.

Field Roots. This year the root crops were grown on that portion of the farm formerly known as Field No. 15, the old permanent pasture which was plowed two years ago. It is mostly low land, and only partially underdrained, so that with the wet season and a large number of wire worms, which are always numerous in old sod, our root crop was a partial failure. There were three acres each of Long Red and Yellow Intermediate mangels, and two acres of sugar beets, giving a total yield of 3,200 bushels, an average of 400 bushels per acre. Six acres of Swede turnips gave a total yield of 2,650 bushels an average of 441 bushels per acre.

Potatoes. Six acres of potatoes were grown on the same portion of the farm. Following are the varieties: four acres of Empire State, half an acre each of American Wonder, Crown Jewel, Rose of Erin and Burpee's Extra Early. We had the appearance of an abundant crop until the beginning of August, when the tops became diseased; and then the tubers commenced to rot. On the 25th August, dry weather set in, which checked the disease. Although two-thirds of the crop was destroyed, we harvested 545 bushels of sound potatoes.

Fall Cultivation. The success of our crops depends very much on the thorough cultivation of the soil the previous fall. Our method is as follows: In August we commenced plowing sod in the 90-acre section intended for corn, roots and peas the following year. This was plowed about three inches deep, and, as there was a heavy growth of clover, chains were used on the plows to drag it under. The land was harrowed soon after being plowed and the vegetable matter being near the surface rotted quickly, so that in about three weeks after being plowed it was cultivated across with the spring tooth cultivator. Should any thistles or other weeds appear, those portions are gone over with a broad-share cultivator. During October and November all the manure made through the spring and summer, which had remained in the barnyard, was hauled out and spread on the surface as far as it would go at the rate of sixteen loads per acre. This was covered with a double mouldboard plow in drills about twenty-two inches wide. By this means the decomposed vegetable matter and manure were placed in the centre of the drills where it will remain during the winter without fear of leaching away or being lost by evaporation. On the balance of this section the manure will be hauled out during the winter and spread on the snow, and in the spring gang-plowed lightly to mix it with the surface soil. The fall cultivation of our corn and root land was as follows: As soon as the corn was harvested, the land was cultivated with the broad-share cultivator with the centre tooth removed, cultivating along the rows. This cleaned the land of weeds, except those in the corn rows (which were more numerous than usual, owing to the great amount of rain). These were destroyed by plowing out the corn roots with an iron plow, without the mouldboard, and harrowing, after which the land was drilled with a double mouldboard plow. In ordinary seasons it is not necessary to plow out the corn roots, simply cultivate and drill with the double mouldboard plow lengthwise with the rows, so that there will be a row of corn roots in each alternate drill. By this means the corn roots may remain in the ground until they rot. The potato and root land is ribbed across the old drills, turning the tops into the centre of the drills. Thus all the vegetable matter that has become decomposed during the summer and made available for plant food is preserved in the centre of the drills for the next year's crop. Land treated in this way and seeded with a grain crop invariably gives good results; and with such treatment we have never failed to get a good catch of clover.

Live Stock. We have at present fifty-six head of cattle, viz., twenty-one feeding steers, twenty-seven females of the different breeds, required for educational purposes and

to supply the college with milk; also eight bulls of the different breeds. Fifteen of the steers were tied up on the 1st November, their average weight on that day being 1,222 pounds; the remaining six are together loose, their average weight November 1st being 1,219 pounds. Both lots are receiving the same food and attention, and with two exceptions all are dehorned.

RESULTS OF FEEDING STEERS. On November 20th, 1896, eleven steers were bought, averaging 1,035 pounds at three cents per pound. They were sold July 3rd, 1897, averaging 1,383 pounds at five cents. Following are the results, with variety and cost of food. Silage is valued at $1.50 per ton, roots $2.00, clover hay $7.00, chaff $1.50 per ton, mixed grain and bran 75 cts. per hundred:

Ration for December.

17 lbs. silage	cost	$1.27
17 " pulped roots	"	1.70
10 " cut clover hay and chaff	"	2.12
3 " bran	"	1.50
Rape at noon	"	2.00
Average cost per day		$8.59

Average gain in weight for December, 91 lbs. at 5 cents $4.55
Less cost of food 2.66
Average gain per steer for December $1.89

For January, the same mixture was used, except that 4 lbs. chopped grain and bran was fed, and the rape at noon was changed to 30 lbs. sliced turnips.

30 lbs. turnips	3	cents.
4 " grain and bran	3	"
Cost of food per day.	11.09	"

Average gain in weight for January, 76 lbs. at 5 cents $3.80
Less cost of food 3.44
Average gain per steer for January. $0.36

In February, the same as January ration, but the grain and bran was increased to 7 lbs..... 4.75 cents.
Average cost per day . 12.84 "

Average gain in weight for February, 69 lbs. at 5 cents $3.45
Cost of food 3.59
Average loss per steer for February. $0.14

March ration just the same as February.

Average gain in weight for March, 63 lbs. at 5 cents..... $3.15
Cost of food 3.98
Average loss per steer for March .. $0.83

In April half chopped grain and bran was added, making
Average cost per day.. 13.71 cents.

Average gain in weight for April, 59 lbs. at 5 cents 2.95
Cost of food 4.11
Average loss per steer for April.... $1.16

The May ration was the same as April.

Average gain in weight for May, 40 lbs. at 5 cents $2.00
Cost of food 4.25
Average loss for May $2.25

Ration for June:

30 lbs. silage	2.25	cents.
12 " cut clover	4.20	"
7½ " chopped grain and bran.	5.62	"
	12.07	cents.

Average loss in weight for June, 50 2/11 lbs. at 5 cents $2.51
Cost of food 3.86
$6.37

The loss of weight in June is due to the allowance for shrinkage.

Cost of 11 steers, Nov. 30th, 1896	$341.55
Cost of food for 7 months	284.79
Total cost	$626.34
Sold July 3rd, 1897, for	760.50
Total profit	$134.16
Average profit per steer	$12.20

The steers were kept two months longer than necessary in order that the large number of farmers who visited the college during June might see the result of this method of feeding. Had they been sold two months earlier the profits would have been much greater.

On April 7th, 1897, eight steers were bought. They were sold on July 3rd also. The result was as follows:

Cost of 8 steers, total weight 8,290 lbs., at 3½ cents	$290.15
Cost of feed for 2¾ months	82.00
Total cost	$372.15
Sold July 3rd, total weight 8,930 lbs., at 4 cents	357.20
Total loss	$14.95
Average loss	1.87

They were fed the same as above, but received one pound less grain in April and May, and one-half pound less in June. While there was an apparent loss on these eight steers, there was an actual gain, as a large portion of the food would have been wasted, because it could not have been sold so late in the season.

The steers and milch cows are fed a full ration morning and night of silage, pulped roots, clover hay and chaff, and chopped grain and bran. At noon they get only twenty-five pounds of sliced roots. Under this system better results are obtained, and the animals are healthier than with three full feeds per day.

Sheep. The sheep are in excellent condition, although they get no grain except for about two months in the spring, when they are suckling their lambs, and then only a very limited quantity. During the winter they receive, morning and night, a mixture of cut clover, silage, and pulped turnips. Pea straw alone is fed at noon. We arrange to have the lambs dropped in March. Shearing is done in April, before the sheep are turned out to grass. After shearing, the ewes and also the lambs are dipped to clean them of ticks, etc. This is repeated in October.

Following are the average weights per fleece, unwashed, of the different breeds:

Lincoln	14.21 lbs.	Hampshire Down	8.10 lbs.
Cotswold	13.50 "	Suffolk	7.93 "
Leicester	9.42 "	Dorset Horn	6.78 "
Shropshire	8.96 "	Southdown	6.00 "
Oxford Down	8.33 "		

The wool was all sold for thirteen cents per pound, although the demand at present is in favor of the long wools.

Swine. Of all the animals kept on the farm, our pigs give the best returns for the food consumed. The brood sows are fed, morning and night, boiled roots mixed with about one pound each of chopped grain and bran; at noon they get raw roots. The young pigs, after weaning, get bran, middlings and milk. A number of grade pigs are kept to consume the refuse from the college, as it has been found not desirable to feed this kind of food to breeding animals.

Horses. Four teams and two cart horses are kept for work on the farm. A man is engaged for each team during the summer season. In winter when the farm work is not so pressing, the students get an opportunity of driving the teams. During the summer season, when the horses are hard at work, the daily ration for each animal is a mixture of cut clover and silage—all they will eat up clean—and sixteen pounds of chopped grain and bran mixed. The grain is composed of oats, barley and peas. This winter, when they will have but little work, the ration will be the same mixture of cut clover and silage, morning and night, with six pounds of grain and bran ; at noon, fifteen pounds of carrots with half the quantity of cut clover and silage. By this method of feeding the horses are healthier, and are kept at considerably less cost than by the general custom of feeding oats and hay.

Live Stock for Educational Purposes. The following live stock, all typical, pure bred animals, are kept for educational purposes :

8	breeds of cattle,	1	male and	2	females of each breed.	
9	" sheep,	1	"	6	"	"
5	" swine,	1	"	2	"	"

Practical Instruction. The first and second year students are required to work on the farm or in the other departments each alternate afternoon, for which they are allowed in proportion to the work performed, and credited on their board account.

Before the examinations last June, the second year students plowed a ridge each for the purpose of testing their skill, and marks were given according to work performed. The plowing was judged by the following scale of points :—Beginning, 20 ; even holding, 20 ; shape of ridge, 20 ; straightness, 20 ; finish, 20 ; total, 100. The minimum number of marks required to pass was 40 ; and all passed except two.

In the beginning of November an opportunity was given to the first and second year students, who have had more or less efficiency in plowing, to test their skill in plowing sod. Thirty-five entered into the competition ; and each one plowed ten furrows, using the same team and plow. One hour was allowed for each student. Ten awards were made by competent judges as follows :

1st. W. Mason, Northumberland Co.
2nd. H. P. Westgate, Lambton Co.
3rd. R. J. Broomfield, Ontario Co.
4th. J. Wilson, Bruce Co.
5th R. Wilson, Huron Co.
6th. A. J. McFiggins, Northumberland Co.
7th. E. J. McMillan, Prince Edward Island.
8th. D. McEwen, Northumberland Co.
9th. D. A. Ross, Glengarry Co.
10th. A. F. Eddy, Algoma District.

The annual sale of surplus young live stock was held at the farm on October 13th. A large number of farmers from different parts of the Province were present. The prices realized were considerably in advance of former years, yet moderate, considering the quality and breeding of the animals offered.

11 calves, various breeds, realized	$570.00
29 lambs, " "	335.25
52 pigs, " "	716.75
	$1,622.00

I submit herewith a statement of the farm accounts for 1897 :

CASH RECEIPTS.

Sales of Cattle	$ 1,969 52
" Pigs	1,161 26
" Sheep	220 98
" Wheat	257 10
" Oats	79 62
" Barley	110 28
" Peas	35 00

Sales of Potatoes	$49 45	
" Wool	70 33	
" Hay and Ensilage	13 31	
" Hides and Skins	5 65	
" Milk	109 45	
" Old Fence Rails	36 95	
Service of Animals	158 00	
Feed for Poultry Department	7 46	
Work done at Mr. Harrison's house—men and team	11 25	
		$ 4,295 55

FOOD, FEED, FODDER, AND SERVICES OF MEN AND HORSES SUPPLIED TO OTHER DEPARTMENTS.

To College.

Milk, 6052 gals , at .08	$484 16	
Potatoes, 425 bus., at .40	170 00	
Keep of three horses, 1 year, at $75	225 00	
Team for hauling ice, 3 days, at $2.50	7 50	
Team and man, 1½ days, at $2.50	3 75	
Hauling gravel for reservoir, 150 loads, at .25	37 50	
Excavating reservoir, man and team, 17 days, at $2.50	42 50	
Single horse and cart at reservoir, 26 days, at .65	16 90	
Keep of extra horse carting at reservoir, 13 weeks, at $1.50	19 50	
Horse for hauling sewage during year 1897	50 00	
		$1,056 81

To Experimental Department.

Keep of four horses, 1 year, at $75	$300 00	
Keep of extra horse, 2½ weeks, at $1.50	3 75	
Turnips for experimental feeding, 75 bus, at .07	5 25	
Hay, 11⅓ tons, at $6.50	73 60	
Hauling five loads of pigs to Guelph, at .75	3 75	
		$386 35

To Horticultural Department.

Keep of two horses, 1 year, at $75	$150 00	
Man and team, 1½ days, at $2.50	3 75	
		$153 75

To Dairy Department.

Wood supplied, 72 cords, at $1.25	$ 90 00	
Hay " 38 tons, at $6.25	237 50	
Mangels, 750 bus., at .07	52 50	
Ensilage, 250 tons, at $1.50	375 00	
Pasture, 25 acres, at $4.00	100 00	
Soiling crop, 1½ acres, at $8.00	12 00	
Chaff, 1½ tons, at $1.50	2 25	
Hauling sawdust from mill, 27 loads, at .75	20 25	
Teaming, 1¾ days, at $2.50	4 50	
Teaming ice	5 00	
Milk supplied, 1,637 lbs., at 65c. per 100	10 64	
Service of cows, 10 grade and 10 pure bred	30 00	
	$939 64	
By skim-milk, 30,000 lbs., at 10c. per 10	30 00	
		$909 64

OTHER ITEMS.

Expenditure for steers in 1897 above that in 1896	$686 73	
Allowance for time spent by farm superintendent in other duties	400 00	
Keeping of live stock for educational purposes	400 00	
		$1,486 73
		$8,288 83

DISBURSEMENTS.

Superintendent's salary	$1,200 00	
Wages	2,948 82	
Live stock	1,842 33	
Maintenance of stock	600 80	
Seeds	173 01	
Binding twine	25 20	
Postage, stationery and advertising	119 06	
Fuel and Light	75	
Contingencies	63 70	
		$6,973 67

Permanent Improvements.

Painting, repairs and alterations	$441 68	
Furnishings	128 39	
Implements	190 67	
	760 74	
One-fifth of this expenditure reckoned for 1897		152 15
Total expenditure		$7,125 82
Cash receipts	$4,295 55	
Other "	3,993 28	
		$8,288 83
Net profit		$1,163 01

NOTES.

In 1896 the cost of eleven steers for feeding purposes was $341.55. In 1897, owing to an unusually large amount of fodder, this outlay was increased by getting twenty-one steers, at a cost of $1,028.28 ; hence the increased expenditure of $683.73 for this season on account of steers to be sold in 1898.

A considerable portion of the farm superintendent's time being devoted to work other than that of the farm proper, a certain portion of his salary should be credited in the farm account. The amount might be placed at $400.00, to be an equivalent for the time spent in attendance at farmers' institute meetings, lecturing in college, attending to visitors nearly every day during the month of June, drawing plans for beautifying country homes, besides attending to a large correspondence.

In addition to the above an amount should be credited to the farm for the maintenance of live stock that are kept for educational purposes.

Respectfully submitted,

WM. RENNIE,
Farm Superintendent.

PART XII.

REPORT OF THE

MANAGER OF THE POULTRY DEPARTMENT

To the President of the Ontario Agricultural College :

Sir,—I have the honor to submit herewith my third annual report with details of a few experiments undertaken, and work accomplished during the past year.

Numerous letters were received during the year from different parts of the country describing the symptoms of different diseases that had broken out among flocks of fowl, and asking for causes of the disease and remedies. These inquiries received careful attention and the best known treatment was recommended in each case. In most cases very favorable results were attained.

Inflammation and protrusion of the egg passage.—On the 10th of April we had a hen suffering from an inversion of the egg-sac (containing the egg) which had been expelled. The egg was removed in the following manner: The sac was washed with warm water; then the egg was broken at the end and its contents removed before destroying the shell; the shell was then removed in parts, not allowing any to remain in the sac; and by careful manipulation the sac was put into its proper place while the hen was held head downwards. The hen was then removed to a quiet place, and in a few days was apparently as well as ever, and continued to lay during the season.

Soft eggs.—The laying of soft shelled eggs or eggs without any shell arises from several causes, and all cases cannot be treated alike. The shell of the egg consist entirely of carbonate of lime, and the requisite quantity for the formation of the shell must be obtained in or with the food; otherwise soft eggs will result. When unshelled eggs arise from a deficiency of calcareous matter, the remedy is evident: A quantity of old mortar, or oyster shells broken up will readily supply the material needed. If fowls are excited or worried in their pens or yards, it may cause soft-eggs, especially among the larger breeds of poultry.

Apoplexy.—The symptoms of apoplexy are very plain and decisive. A bird apparently in the most robust health will fall down suddenly, and may be either found dead or without sensation and the power of motion. It is occasioned by the rupture of a blood vessel in the skull, and the consequent flow of blood pressing upon the brain produces the trouble.

Causes.—It is invariably caused by a full habit of body, and is more frequent in over-fed birds, and most common among laying hens, which are often found dead on the nest. No doubt the expulsive efforts when laying bring on the attack. We find the Plymouth Rock fowl quite subject to this disease, as they take on fat more readily than any other breed of poultry. We lost two Barred Rock hens with this disease this season; one was found dead on the nest and the other under the perch.

Treatment.—In this disease little can be done towards a cure in an actual attack, but a great deal may be done in the way of prevention, as over-feeding or using over-stimulating food, and the want of sufficient exercise, greatly increase the danger of this disease

Vertigo.—A bird affected with vertigo may be seen to go around in a circle, or may flutter about with but little control of its muscular action.

Causes.—It is caused by a rush of blood to the head, a sudden fright, or the result of over stimulating diet.

Treatment.—I have found that holding the head of the bird affected under a stream of cold water, or pouring cold water on the head for a few minutes will arrest the disease. Afterwards an opening medicine should be given which will remove the tendency to another attack.

Crop-bound.—The crop, whose office is to receive the food when swallowed and transmit it to the gizzard in portions, may become so over-crowded that it is impossible for it to expel its contents into that organ. The gizzard being empty, the bird continues to feel hungry and eats until at last by the swelling of the grain a hardened mass is formed in the crop, and the enormous size gives evident indications of its being bound.

Treatment.—In ordinary cases, a dessert spoonful of castor oil poured down the throat, and the kneading of the crop with the thumb and finger will remove the trouble; but I have known cases where a purgative medicine did not serve the purpose. I operated on two cases this season. Making an incision with a sharp knife, first through the skin and then through the upper part of the crop, I removed the food with a wooden spoon. A few stitches closed the incisions, and the birds recovered in a few days.

Chicken pox.—An eruption on the face, comb and wattles. This disease is very contagious, and birds affected with it should be at once isolated. I went last spring to see a flock where this disease had broken out; more than half of a flock of Rocks were thus affected.

Treatment.—I had the diseased parts washed with warm water and carbolic soap, then the scab was easily removed from each pustule and the sore was touched with lunar caustic (nitrate of silver). One application was found sufficient to effect a cure. Persons using caustic should be careful not to touch the eyes, as it will destroy the sight.

Leg weakness.—This disease usually occurs in young birds while growing, and more frequently in cockerels than pullets. The bird sinks upon its hocks after standing for some time, unable to support itself, and in bad cases unable to get up. In other respects the health may be good.

Causes.—This complaint, which often attacks the finest and best specimens, is caused merely by a rapid increase of weight which is out of proportion to the muscular development, and is most common in the heavy varieties, as Cochins and Brahmas.

Treatment.—A due supply of nutritious food, care being taken to select such food as is flesh-producing and not fattening, avoiding the use of corn and peas. A little chopped meat or ground green bone two or three times a week, along with ground oats, middlings, or bran, is considered the best food to use, with a liberal supply of skim milk.

Scurfiness or scaly legs.—A peculiar scurfy eruption is developed between the scales on the legs. In several cases where the disease has been allowed to go unchecked, agglutinated masses of scurf an inch in thickness are produced on the back and front of the legs.

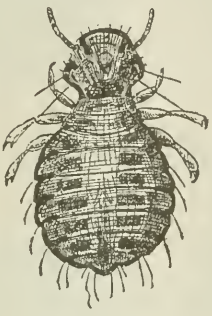
Causes.—Microscopic investigations have proved that this disease is caused by a parasite or insect that works between the scales on the legs.

Treatment.—Soak or wash the legs in warm water until the scurf is softened, so that it can be removed. Apply lard and sulphur, to which may be added a little carbolic acid. Severe cases may require two or three applications before a cure is effected. Wampole's antiseptic solution, if applied at the commencement, will prevent further trouble.

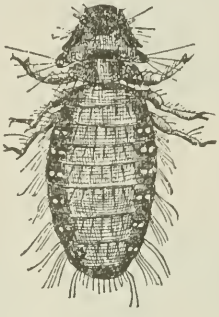
The Tick Louse.—This insect may be found with its head embedded in the skin of the chick's head. Thousands of chicks die annually from this cause. The presence of these lice is known only by the experienced poultry breeder. I have sometimes found more than a dozen upon the head of a single chick. The following treatment, recommended by Mr. Lewis Wright, is a sure preventive, if applied when the chicks are but a few days old; or it may be applied when the chicks are first removed from the nest:

Mercurial Ointment	1 ounce
Pure Lard	1 "
Flour of Sulphur	½ "
Crude Petroleum	½ "

Apply a small amount to the head of chick in a melted or semi-fluid state.



Fowl louse (*Goniocotes hologaster*) (greatly enlarged,)



Fowl louse (*Menopon pallidium*) (greatly enlarged)

We are still in the dark as to the source of these lice. They have never been discovered on hens. They are not hatched with the chick, as they are not found on chicks hatched artificially and raised in a brooder. At least this is the case in my experience.

Bronchitis.—A cold may settle on the lungs and in the throat and not affect the head as in roup, the symptons being different. There is a rattling in the throat, from the accumulation of mucus, which the bird coughs up and expectorates at intervals.

Treatment—The bird should be kept in a dry room; and a small quantity of kerosene oil given daily for three or four days, will effect a cure A small oil can such as is used for a sewing machine, is the most convenient when oil is to be administered.

I purchased two birds at the Ontario poultry show held in Guelph last winter. Both were suffering from this disease, contracted at the exhibition, and were cured by the above treatment.

Roup—At our fall exhibitions we invariably find chickens affected with this disease; and I am sorry to say that I have noticed birds exposed for sale on the markets that have had every evidence of having "roup." It is almost incrediable, yet a fact, that hundreds of birds are offered for sale on our markets every season that have been diseased. Fowls showing signs of disease are sold to hucksters and by them dressed and marketed; and to avoid snspicion, the heads are removed, so as to prevent detection Never sell a fowl that you cannot leave the head on. Never buy one with the head off.

Symptoms—The symptoms of roup are those of catarrh or cold affecting the lining membrane of the nasal cavities. The cavities often become so clogged by a thick discharge as to fill the eyes, and when neglected may entirely close those organs. This discharge when collected forms a cheesy mass that has a very offensive odor. Fowls having a cold or distemper and a discharge from the nasal passages, may be thought to have roup; and, if neglected, such colds and distempers often pass into roup. While the discharge

remains thin and watery and devoid of odor, there is usually nothing beyond a severe cold; but if it thickens and becomes offensive, the general health also suffering, roup has supervened.

With respect to the communication of this disease, experiments prove that it is contagious. I procured a bird, a Brown Leghorn cockerel, affected with roup last April. I placed a hen in the best of health in the same coup and in ten days she exhibited the symptoms of the disease in its worst form. Both birds were allowed to drink from the same vessel; and I am inclined to believe that the disease is generally communicated in this way, as the discharge from the nostrils of the sick bird contaminates the water which it drinks.

Treatment.—In general, I would say: kill a roupy fowl at once, unless a valuable bird, rather than run the risk of communicating the disease to the remainder of the flock. Warm, dry, and comfortable quarters and nutritious food are the first essentials to recovery, and the frequent removal of the dry discharge from around the eyes and nasal cavities by bathing with warm water must not be omitted. I have used Dr. Hess's Pancea with good results. The use of kerosene oil, injected into the nasal cavities, and a little added to the drinking water, will be found a useful remedy.

Egg-eating.—This habit may be prevented by placing six or seven artificial eggs in the nests. I have cured the most confirmed egg-eaters in this way. They soon tire of pecking at them, and in a few days are broken of this vice. The habit is generally confined to hens in close quarters, and may be acquired from hens laying soft shelled eggs that get broken in the nest or on the floor.

While there are numerous other diseases, the foregoing are the most prominent and important; and my attention has not been directed to any but the above during the past year.

Testing Eggs.

To attain the best results, it is necessary to test the eggs during the period of incubation. Our practice is to examine the eggs on the sixth day and remove those not fertile. This is best accomplished at night or in a dark room with the aid of a lamp and an egg tester. A piece of cardboard with an oval hole cut in the centre, not sufficiently large to allow the egg to pass through, may be used. The cardboard is held in front of the light, and the egg to be examined placed within the opening. A proper egg-tester can be purchased very cheaply from incubator manufacturers, with which the eggs can be tested more accurately and rapidly. Few persons understand testing eggs properly, being unable to detect the fertile eggs, *i.e.*, to distinguish a dead from a living germ, or a weak from a strong one. A little practice renders the distinction easy. A fertile egg will on the sixth day (temperature having been kept at 100° to 103°), show a dark, movable spot with veins running from it, somewhat resembling a spider as in Fig. 1. A weak germ will show a spot, but is cloudy-looking and muddled, as in Fig. 2. The unfertile or sterile eggs are readily distinguished, being clear, and the yolk easily seen, which looks somewhat darker than the rest of the egg and not muddled. Those who follow the plan of testing will find it advantageous to set two hens on the same day; and on examinining the eggs on the sixth day, if many unfertile eggs are discovered, the fertile eggs from both may be given to one hen and a fresh setting placed under the other. The clear eggs may be preserved, as they are valuable food for the young broods.

Fig. 1 represents a strong fertile egg as seen in the tester on the sixth or seventh day; the dark spot *b* is the live germ, *aa* blood vessels extending from it. The germ *b* will be seen by placing the egg against the aperture of the tester and revolving it between the thumb and finger until the side on which the germ has formed comes nearest the eye. The germ at this time, being quite lively, can be seen to move.

In a strong fertilized egg, the blood vessels should show plainly; but the germ is not always seen so plainly, as it varies, more or less, with the color and thickness of the shell; *c* shows the average size of the air-space in an egg on the sixth day of incubation.

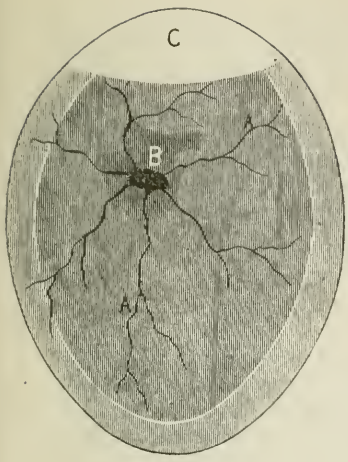


Fig. 1.

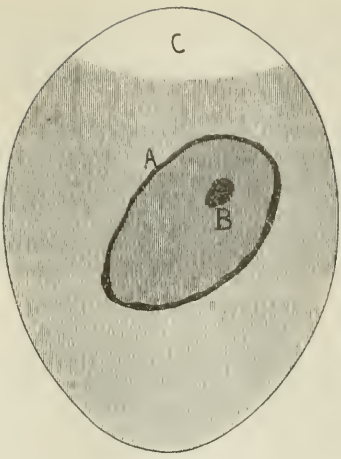


Fig. 2.

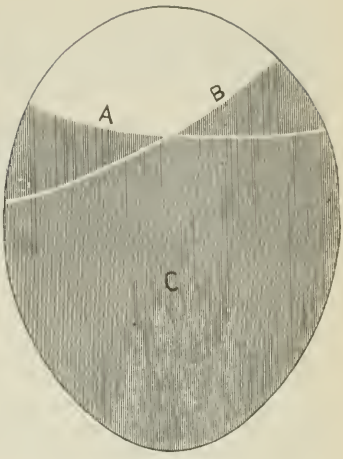


Fig. 3.

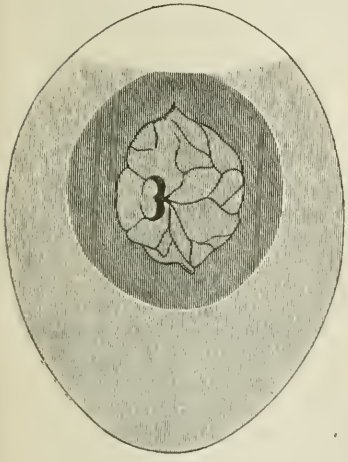


Fig. 4.

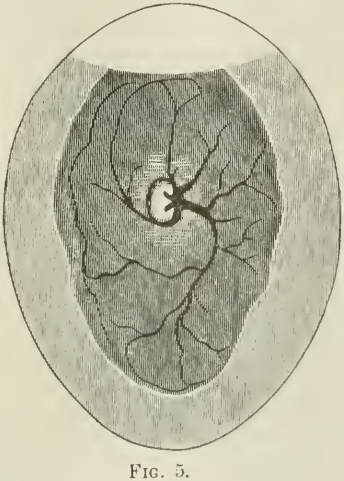


Fig. 5.

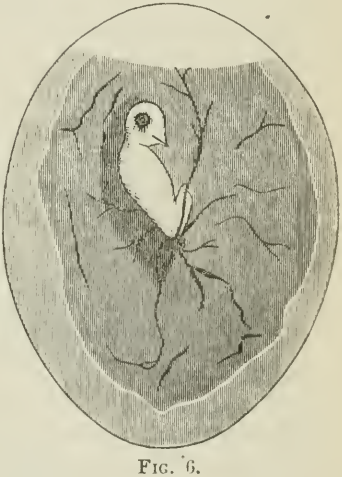


Fig. 6.

Fig 7.

Fig. 8.

Fig. 9.

Fig. 2 represents a weak or imperfectly fertilized egg, as seen in the tester on the sixth day; *a* is an oblong or circular blood vessel which has started, but nothing more. B is a small dark spot, a weak germ without blood vessels; *c*, the air space. This egg will not hatch, and should be removed.

Fig. 3 represents a live egg on the sixteenth day; *c* is the space occupied by the chick. Lines *a* and *b* show the air space, which may be on the top, or partly to one side, as indicated by the respective lines. At this stage in the period of incubation, a live chick darkens the egg, except the air space, when seen through the tester.

Eggs should be tested in a warm room free from draught.

Development of Chicks.

Fig. 4 shows the heart and minute arteries and veins in a circle on the yolk, which is enclosed in a thin sac. They may be seen by the naked eye when a fertile egg is carefully broken into a saucer after thirty-six hours' incubation. The veins gradually surround the yolk, from which the chick derives its nourishment during the period of incubation. What is left of it is drawn into the abdomen just before hatching.

Fig. 5 represents the interior of the egg on the sixth day, when the live germ can be seen to move, and will appear on top when the egg is laid on the side. In testing, the large end of the egg is held up as in fig. 2 which shows how the egg looks in the tester through the shell. Fig. 6 is seen with shell partly removed.

Fig. 6 shows the appearance on the eighth or ninth day.

Fig. 7 represents the eleventh or twelfth day.

Fig. 8, the development on the fourteenth day.

Fig. 9, the sixteenth.

Dead in the Shell.

Why do chicks die in the shell; and what is the cause?

This question is very frequently asked, not only by those who use incubators, but by those using hens, geese, turkeys, and ducks for hatching. In a great many instances, the cases of "dead in the shell" may be attributed to the incubator or sitting hen; yet it cannot be so in all cases. Some hens steal their nest and bring out a full hatch; others do so and hatch only a very small percentage, or fail to hatch any.

A hen that hides her nest generally sits on her own eggs; and if they are strongly fertilized, and she is attentive, and she has a good place to sit, she usually brings out a good hatch. If the eggs are not well fertilized, you may expect poor results.

The unhatched eggs may prove to be unfertile, or most of the chicks may be dead in the shell. What is the cause? A poor incubator, or a bad sitter may cause the trouble; but if a hen sits steadily on thirteen eggs and only hatches four or five of them, is it not reasonable to suppose that the unhatched eggs have differed somewhat in quality at the beginning, or they, too, would have hatched? All having been subjected to the same treatment and conditions, why did not all hatch, or all fail to hatch, if they were all alike at the time of setting?

There are many answers to this question. It might be a lack of vigor in the germ, traceable to the parent stock, or a weakly condition of the laying stock from which the eggs were procured. Had all the eggs failed to hatch, we would naturally suspect that the hen had neglected her nest; but as some hatched, the blame could not be attributed to the hen, for chicks could not be produced without proper conditions of incubation to which they were subjected together with those that failed to hatch.

NOTE.—The nine illustrations on page 227 are taken from "The Art of Incubation and Breeding," by Col. Van. Culin (1894).

Hens that are too fat do not produce eggs that will hatch well; and the chicks that do hatch from such eggs will generally be found weak. The germs do not seem to receive the proper nourishment to develop strength enough to enable them to break the shell, even if they grow to full size.

Stale eggs do not hatch well. Fowls kept in close confinement lose their vigor. They must have a reasonable amount of exercise to produce good fertile eggs.

It is quite possible to kill a vigorous germ, or a full-grown chick, by improper treatment. Too much or too little moisture, heat, or ventilation, may ruin a hatch. Lack of moisture at the time when needed, or too much when not required, will injure or destroy life when hatching by artificial means.

Eggs of various breeds vary considerably in shell. Some are thick and porous, some thick and dense, or hard, while others are thin and porous. The question of how much moisture should be used in an incubator has never been fully and correctly answered. We find that different incubator manufacturers differ materially as to the amount of moisture which should be used, when to use it, and how to apply it. When we think of the great difference in the construction of incubators, and the different kinds of shells that envelop the egg, each requiring different treatment (the hard shell requiring more moisture than the porous one), we at once see the difficulty in coming to a conclusion as to how much moisture should be used in an incubator.

I find that the printed directions sent out by the manufacturers of incubators do not in most cases give satisfactory results.

Periods of Incubation.

Chickens	Twenty to twenty-two days.
Geese	Twenty-eight days.
Ducks	Twenty-eight days.
Turkeys	Twenty-eight days.
Guinea Fowl	Twenty-eight days.
Pheasants	Twenty-five days.
Partridges	Twenty-four days.
Ostriches	Forty to forty-two days.

Feeding and Value of Different Foods.

It is obvious that the cheaper the cost of production the greater the margin of profit. All food given represent cash expended. Food may be productive, yielding more than its own value; or it may be wasted, producing nothing whatever; and, again, it may be injurious to the fowl, producing so much actual loss. What should be sought after in the management of poultry is a well-balanced ration. As an egg contains animal food in its natural form, its regular production must demand a sufficient supply of food adapted to produce it.

Fowls are raised either for the table or for egg production. In the former case the object is to prepare the young chickens so that they may be fit for market at the earliest possible period. It is evident that they are not only better in quality, but command a better price when they are young; and as young birds consume a smaller amount of food on account of their shorter lives, they inevitably return a larger profit than older ones. Eggs are obtained from hens out of the materials furnished by their food, and a scanty supply of the former is therefore the inevitable result of a short supply of the latter. In winter, when eggs are scarce and most valuable, this is particularly shown, for as then no insect or other food is to be obtained by scratching, the production of eggs is diminished, unless the fowls are well fed with proper egg-producing food.

How often to feed. If fowls have a full range we believe in feeding twice a day. They should receive their morning meal at a fixed hour, and their evening meal as late as they can see to eat before going to roost. If is often asked how much feed should be given per

head? It is impossible to give an answer to this question that would be of any practical value, as so much depends on the size of the birds and the amount they have obtained during the day. It is obvious that a fowl weighing ten pounds, and another five pounds, require different quantities of food.

When a hen is producing eggs a greater amount of food is required. Nevertheless there is a rule which is easily understood, which will secure both health and eggs—that is to give the birds no more than they will eat with an eager or ravenous appetite. We often have visitors remark, when passing through our buildings, that our fowls must be starving, for when their food is given them they fly in the air and endeavour to get into the pail containing the food. They are, in fact, always ready for their food, and we may say that this is the way it should be. It has been my experience that this system of feeding is the best.

In bad or cold weather, or when fowls are moulting, a little more may be given, but we never allow our stock (speaking of adults only) to eat till they are fully satisfied.

Different foods. In choosing foods, either meal or grain, there is a considerable variety to select from, and it is well to give a change.

Corn is chiefly remarkable for the quantity of oil it contains; and, if used exclusively, poultry fed with it are very apt to become too fat; but when fed in conjunction with other food, it will be a valuable addition to the poultry ration.

Buckwheat, which is very largely used as poultry food in different parts of the country, in consequence of its low price, is not quite equal to barley or wheat in the amount of gluten it contains, yet the French, who send immense quantities of poultry and eggs to the English market, used buckwheat almost exclusively both for fattening and egg production. From our experience we can confidently recommend its use as a staple in preference to almost any other grain.

Oats may be fed for a change, but the heaviest samples should be procured, as they contain little, if any, more husk than the lightest, and are consequently much cheaper, if the proportion of meal is taken into consideration.

Peas may be regarded as stimulating for general use.

Wheat is a favorite food for fowl and they eat it greedily; but it should be used sparingly on account of its tendency to produce fat.

Clover Hay—There can be no doubt that clover hay is an excellent food during the winter months or when fowls are confined to small runs during the summer, as it supplies the want of green food. It should be cut as fine as possible with a clover cutter and then steamed for several hours either in a kettle or by throwing boiling water over it in a tub, which should be covered over so as to retain the steam. When fed, it should be mixed with shorts or bran, as the fowls do not eat it very well when given alone. This makes an excellent morning ration and should be fed at least two or three times a week.

Milk.—Milk, either sweet or sour, we find to be an excellent food for poultry as regards health, growth and egg production.

Green Bone.—At my request, Prof. A. E. Shuttleworth made an analysis at the laboratory of samples of the fresh ground green bone, meat meal, and dried-blood meal which were being fed at this department. The results were as follows:

	Protein.	Phosphoric acid ($P^2 O^5$)	Lime. (Ca. O)
Fresh green bone	17.87	13.20	18.84
Meat meal	56.06	7.07	8.94
Dried-blood meal	95.75	Traces	Traces

From the best authorities we learn that lime, nitrogen and phosphoric acid are among the important constituents of eggs; also that green bone is rich in albumen: hence the value of green bone as an egg producing food.

The blood meal and meat meal were furnished us for trial by Mr. Fearman of Hamilton, and I have no hesitation in saying that for fattening purposes, if mixed with the soft feed it is a great acquisition. Birds fed thus, increase in weight much faster than those fed without the meal.

Winter Rations.

Ration.—Morning: Cut clover hay, ground oats and middlings, equal parts, mixed with warm water. Feed this in a "crumbly" state, not porridgy, and in such quantities as barely to satisfy the hunger of the birds.

Noon: A very small quantity of grain thrown in litter or straw on the floor so as make fowl work; otherwise they will huddle together in the corner of the pen or sit on the perch without having sufficient exercise to keep them in a healthy condition

Night—The last meal, which should consist of grain, should be given just before dark and in such quantity as to fill their crops before going to roost.

Ration 2—Morning: Boiled potatoes, to which add bran and oat or barley chop and season with salt.

Noon: Enough grain, (barley, wheat or oats) to keep the fowls active.

Night: A liberal grain ration.

Ration 3.—Morning: Cut green bone, at the rate of four to six pounds for every twenty hens.

Noon: A little grain, and vegetable food, such as cabbage, beets or turnips.

Night: Grain, the kind being changed as often as possible.

Ration 4.—Morning: Cut clover hay, turnips or other vegetables boiled, bran and middlings or shorts, mixed and fed warm.

Noon: A little millet seed thrown among the litter, for the purpose before mentioned.

Night: The same as in foregoing rations.

Ration 5.—Morning: Bran, pea-meal, and finely cut clover hay.

Noon and night: Same as in ration 2.

Information Wanted.

During the past year, I have received numerous letters from different parts of the country as to the proper mode of feeding, when and what to feed, etc. This goes to show the greatly increased interest which is being taken in this branch of the work. I have answered concisely in the light of experience and observation the following questions received from farmers and others interested in the raising of poultry:

Question.—How do you manage to keep fowls free from lice and disease?

Answer.—By keeping the poultry house clean; having proper ventilation and using dust baths composed of road dust to which sulphur has been added, kerosene oil applied frequently to the perches and inside the nest boxes, fresh drinking water supplied daily, and in summer never allowed to stand in the sun until it becomes warm or put into a vessel that will allow the water to become contaminated with any kind of dirt, a supply of green and animal food when hens are confined to their winter quarters or in small yards. Do not omit grit, such as mica, crystal, broken oyster shell, and clean gravel; use a variety of food; and never keep more fowls than your poultry building will accommodate without over-crowding.

Question. For the production of eggs, table birds, or both, what breeds or crosses would you recommend as likely to give most general satisfaction?

Answer.—My experience has been that an egg-producing strain can be secured from almost any breed by systematic selecting eggs from the best laying hens, and using these eggs for hatching. We find some strains of Wyandottes, Rocks, Javas and Brahmas much better than other strains. For winter laying the Rocks, Wyandottes, Javas, Light Brahmas and Langshans, are considered the best. For summer laying the Andalusians,

Leghorns and Minorcas will undoubtedly give a larger yield of eggs than any other varieties of pure-bred fowl, especially if allowed their liberty, as they are great foragers and may be termed non-sitters.

The winter varieties mentioned lay dark or brown-colored eggs, while the latter, or non sitting varieties, lay white eggs.

The Andalusians and the Minorcas lay the largest eggs; yet those layed by the Rocks. Brahmas, or Javas, may weigh as much, since the white of the egg from the latter is thicker and heavier, and the shell is thicker and denser.

As an all round fowl I consider the Plymouth Rock equal, if not superior, to any of the varieties above mentioned, as they mature early, are good winter layers, and fine table fowl, and their flesh is of the finest quality.

Question. Can you give me any idea why some eggs do not hatch while others contain strong and active chicks?

Answer.—To account for eggs not hatching, we are compelled to look back beyond the production of the egg itself. A pullet not fully matured cannot compete with a year-old hen, while a hen two or three years old is not a vigorous rival of the pullet. An imperfect egg will not produce a perfect chick. Eggs vary in size and shape. A hen may steal her nest and hatch out every egg, providing they are fertile, because the eggs are uniform in every respect, as they are all her own laying; and such hens, having their liberty, are usually in full vigor. When eggs are placed under a hen, or in an incubator for incubation, they may have been produced by as many different hens as there are eggs, and in looking them over we find the very small egg, probably from an immature pullet, the large egg, of abnormal size and irregular shape, which may have been produced by the over-fat hen, the egg with a thin shell, and another with protuberances. With deficiency of vigor in the hen, impotency of the male often combines to cause failure. An egg perfect in shape, normal in size, with the shell free from defects of any kind, and fertilized by a male bird in full vigor, should produce strong, active chicks.

Question.—During what period of the year is it advisable to keep the male birds with the hens, and how many hens would you allow to one male?

Answer.—It is my opinion that hens will lay fully as many eggs, if not more, when kept away from the male; and that unfertilized eggs will keep much longer than fertilized eggs is an undoubted fact, for an egg not impregnated will come out from under a hen clear and good, while one that has been fertilized is spoiled if it is sat upon for even one or two days. An egg not impregnated may be sat upon for several days, and then be used for culinary purposes equal to the common run of store eggs. The hen is capable of producing eggs quite as well without the male, Hence the male is in no manner necessary to the production of eggs, his functions being simply to impart life to the egg for the purpose of reproduction. There are certain stages in the development of the eggs and their relative position when the influence of the male at a single union with the hen will impregnate several at a time, while at other times his influence does not extend beyond one.

With the larger varieties, I consider from six to ten hens sufficient to mate with one male. With the smaller varieties, from fifteen to twenty would not be considered too many.

Question.—Do you think it necessary to give tonics or stimulating food, such as Douglas's mixture, red pepper, etc., or what food would you recommend for fowls during the moulting season?

Answer.—Fowls when moulting are or should be as healthy as at any other period during the year. I do not believe in using any tonics or stimulants at any time, unless it would be for sick birds. As the growth of the new feathers takes from the fowl the elements necessary for the production of feathers, the food should be highly nitrogenous—meat, fresh green bone, and milk being preferred, mixed with their grain ration. This is all that is required as far as food is concerned. Often fowls are nearly naked; hence, at such times, a dry place and protection against exposure should be provided.

Question.—What kind of floor would you recommend for poultry houses?

Answer.—This largely depends on the soil on which the poultry house is erected. If you have a sandy or gravelly subsoil, all that is necessary is about a foot deep of sand or finely sifted gravel, the same as is used in scratching pens in our buildings at the Farm. The subsoil being gravelly, we find no difficulty in keeping it perfectly dry. If it be a clay subsoil, even though you have drainage from your buildings, you will find it impossible to keep a sand or gravel floor as dry as it should be. In such cases a board floor placed a foot from the ground, and covered with a few inches of gravel or sand, will give the best results. We find no objection to concrete; the objection that it is cold and disagreeable to the fowls is entirely overcome if it is kept covered with gravel or sand, as the floors of all poultry houses should be. It is proof against rats and similar vermin, and is so much more durable than boards that some prefer it for these reasons.

Question.—In your experience with pure-bred fowls, what shaped hen gives the best record, or has shape anything to do with it? Is there such a thing as an egg type, *i.e.*, a peculiar shape and style characteristic of all good layers?

Answer.—I have never noticed that the best laying hens had any peculiar shape of body, and do not believe that the general make-up has anything to do with the laying qualities. Some hens are more prolific than others, and if eggs from such hens alone are used for hatching, the laying qualities of the stock will be much improved. A prize bird or a high scoring bird will not necessarily lay any better than one of ordinary merit. Hens or pullets that are active and always busy about the yard are the ones that produce the most eggs.

Question.—Would you advise a farmer to keep pure-bred stock in preference to the common barn-yard fowl?

Answer.—Pure-bred fowls cost no more to keep, bring better prices, and are altogether more profitable than the ordinary class of hens kept on the farm. Therefore, we would certainly recommend the raising of pure-bred stock.

By selecting one breed, you will have a uniform flock of birds, and the eggs from one breed will be uniform in color, which enhances the market value. If the birds are to be sold when young as broilers, or at any other time, their carcasses will also be of a uniform color, and, if well fattened and properly dressed, will bring the highest market price, for the pure-bred trade mark is there. Again, eggs from pure-bred stock can be sold at an advanced price for hatching purposes; and there is always a good demand for pure-bred cockerels in the fall, which is another source of revenue.

In selecting a breed, farmers and others should bear in mind what their market calls for. If both eggs and dressed fowl are required, either the Plymouth Rock or Wyandotte will best suit the purpose. They will be found to produce a good quantity of fairly large and uniform brown eggs, while the cockerels mature early and have the yellow skin which is so much desired in our Canadian markets.

If egg production alone is the chief object in view, the Leghorn, Minorcas, or Andalusians may be selected and will be found to give general satisfaction.

Experiments Made.

Fertile versus Infertile Eggs.—This season an experiment was made to test the keeping qualities of eggs laid by hens with which no male bird was permitted to run, and eggs laid by hens which were accompanied by the male. Further experiments along this line will be conducted at greater length during 1898, and also to determine what is the difference, if any, in the number of eggs laid by a pen of fowls mated with a male, and a pen of an equal number of birds of the same breed and ages not so mated.

On the 15th of July, 1897, four dozen fertile eggs and three dozen unfertile eggs were placed in the egg closet used by the department (the construction of which was fully explained in my report of 1896), and subjected to a temperature varying from fifty to sixty degrees. These eggs were merely laid on their sides in bran and not turned. On examining some of the eggs a month after they were placed in the drawers, no perceptible difference could be discerned; and this was practically the case when the second trial was

made on September 15th. At the test which took place on October 15th, however, it was noticeable that the whites of the fertile eggs were somewhat more watery than those of the infertile eggs, but not much difference could be found in the yolks. At the test made on November 15th, the result obtained at the October breaking was made more manifest, the whites of the fertile eggs being quite watery while those of the infertile were to all appearance as good as in a newly laid egg. During the meeting of the Experimental Union, which was held in December, several thoughts were suggested by the speakers in regard to this important question; and on the 12th December, the remainder of eggs under experiment were broken by myself in the presence of Mr. Thomas Duff, of Toronto, and two of the students. The result was that the whites of the fertile eggs were like water, and in some cases the yolks were broken, while in the cases where the yolks did not break they were found to be very much spotted and discolored, and gave every evidence of going bad. These fertile eggs were totally unfit for table use, and of even a very poor quality for culinary purposes. We then broke the remainder of the unfertile eggs and in every case the whites were found to be all right, and the yolks were standing up exactly as in a newly laid egg, and without showing the slightest tendency towards decay. These eggs were of as good a quality as any that could be bought in the stores for family use; but, of course, they could not be called fresh. The above would certainly go to show that infertile eggs are much to be preferred to fertile eggs; but, as I said before, further and more extensive experiments will be conducted during 1898. In the conclusion of this experiment, a striking feature was the fact that of the fertile eggs, the small white shelled eggs were in a much worse condition and showed greater loss from evaporation than did the large white or the brown shelled eggs. I am satisfied that brown shelled eggs or large white shelled eggs will keep much longer and lose less from evaporation than the small white eggs. Experiments along this line will also be conducted in 1898.

Cross Breeds.

We tried the following crosses this season, and are well satisfied with the results:

Indian Game Cock	Light Brahma Hen
Brown Leghorn "	Barred Rock "
Langshan "	Indian Game "
Silver Grey Dorking Cock	Barred Rock "
Silver Grey Dorking "	White Cochin "

Brown Leghorn—Barred Rock Cross.—Four cockerels hatched on the 27th May and weighed on the 29th November 5¾, 6, 6½ and 7 pounds respectively; two pullets, the same hatch, weighed 5½ and 5¾ pounds respectively. Cockerels and pullets were fully developed and matured on the date mentioned. The pullets commenced laying when five months old. The plumage resembled the Barred Rock in color, and were very handsome birds.

Indian Game—Light Brahma Cross.—One cockerel was hatched on the 2nd June, and weighed 6 pounds 2 ounces on the 29th November. A very fine specimen, a well developed bird with plump breast and body; will make a nice bird when dressed.

Silver Grey Dorking—White Cochin Cross—Two cockerels, hatched on the 27th May, weighed on the 29th November 6 and 6¼ pounds respectively. Two pullets, the same hatch, weighed 5¼ and 5¾ pounds respectively. The cross was not fully matured when weighed.

Langshan—Indian Game Cross.—Two cockerels, hatched on the 27th May, weighed on the 29th November 7¼ and 7½ pounds respectively. Two pullets, same cross, weighed 6 and 6¼ pounds respectively. The plumage is a rich glossy black, resembling the Langshan, while in shape the birds resemble the Game.

Silver Grey Dorking—Barred Rock Cross.—Two cockerels, hatched on the 2nd June, weighed on the 29th November 5½ and 6 pounds respectively. Three pullets, the same hatch, weighed 5, 5¼ and 5½ pounds respectively.

Respectfully submitted,

L. G. JARVIS.

Ontario Agricultural College,
Guelph, November 30th, 1897.

PART XIII.

REPORT OF THE APICULTURIST.

To the President of the Ontario Agricultural College :

SIR,—I have the honor of submitting herewith my report for the year 1897.

The bee-keepers of the Province are taking an increased interest in the experimental work done in the Apiarian Department. Our report has been referred to in the United States and Europe ; and, by resolutions and otherwise, our bee-keepers are asking for increased work in the direction of apicultural experiments.

THE EXPERIMENTAL APIARY.

In the work of 1897, the line of experiment has been followed up in several cases, the object being to confirm or negative the work done during previous years. In the experiment in connection with pure air and artificial heat in cellar wintering, the result of two years' work is now given for the first time. The method of wintering proposed is so different that I thought it well to follow up and confirm the results obtained in 1896 by another season's work.

OUR EXPERIMENT IN OUTSIDE WINTERING.

In last year's report we gave the result of a three years' test in outside wintering, the conditions briefly being as follows : The experiment was conducted with one hive, the brood chamber being divided into two parts—the lower set of frames, ten in number, measuring $14\frac{3}{4}$ x $8\frac{1}{2}$ inches, and the upper ten measuring $14\frac{3}{4}$ x $4\frac{1}{2}$ inches. After swarming the young queen in the parent hive was lost, and we introduced a queen of our own rearing. In the fall of the year the entrance of this hive was contracted to

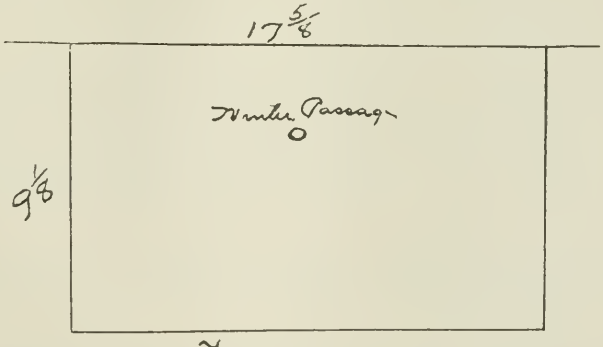


Figure 1.

five inches, and an empty super filled with old woolen clothing for packing placed on it. Without further protection the hive was left on its summer stand, the entrance being kept clear of snow. The hive has now been left in the same condition for four years, including the winters of 1896 and 1897 ; and in every case it has come through in first-class condition. Judging that the advantage and success was in part owing to the free

communication within the cluster, (allowing it to contract and expand according to the surrounding temperature without inconveniencing the bees on the outside of the cluster), we decided to carry on a more extensive experiment during the winter of 1896 and 1897. Eight colonies, or hives, of bees were set aside in eight-frame "Langstroth" hives. Good full colonies were selected, having plenty of bees and ample stores. The frame used was $17\frac{5}{8}$ x $9\frac{1}{8}$ inches.

A hole, about half an inch in diameter, was cut in each frame equal distance from the sides —about six inches from the bottom bar, and three inches below the top. (See Fig. 1.) Figure 2 shows the way in which the bees would cluster on the "Langstroth" combs, their only means of communication being over the top bar, under the bottom bar, or around the ends of the frames. In Fig. 3 is shown the condition of the hive now tested for four years; the bees have ready communication

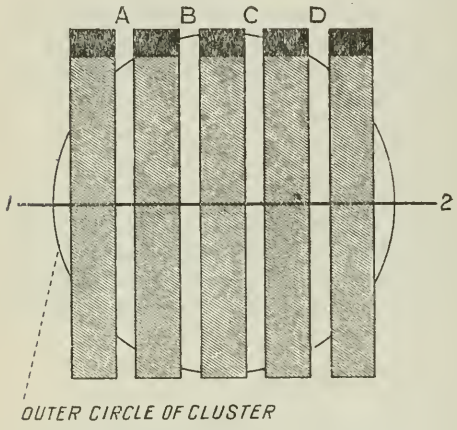


Fig. 2.

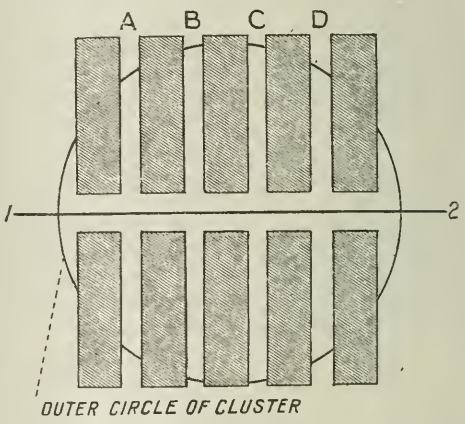


Fig. 3.

between the two sets of combs and through the space between the upper and lower sets of combs; our reason for cutting the winter passages in the "Langstroth" frame was to enable the bees to pass from one comb to another without breaking the cluster. The eight hives were protected on the top with absorbents, as in the case of the first hive tested. The bees in almost every case wintered well; and, as far as could be judged from an examination without actually removing combs, they were in good condition, until well into March. At this time we had a cold rain and ice storm, followed by much higher temperature; the snow and ice melted so rapidly in the neighborhood that the water collected as it had not done in any previous year. When visiting the apiary about 4 p.m. the hives although on stands four inches high, were in from two to four inches of water. They were at once elevated, but the damage had been done. Cold weather followed, making the results still more disastrous; four hives perished out of eight, and the remainder were injured to such an extent that no practical value could be derived from their condition. It seems peculiar, but the odd-sized hive was saved from flooding, through having a special stand under the bottom board, raising it four inches higher than the others.

We notice a peculiarity in one of the eight hives wintered outside. Beginning in October, it was perceptible that every time the bees had a chance to clean house, they did so. This one hive carried out an unusual number of dead bees, and so marked was it that on Nov. 26th the following note was put on the back of the hive: "Bees carrying out an unusual number of dead."

We can account for this in only one way, viz.: That the bees in that hive were more delicately constituted. This is probably a point in bee-keeping to which sufficient importance is not attached. It appears to me quite possible that a ready means of com-

munication from one part of the cluster of bees to another is desirable, because the most trying position for the bees must be towards the outside of the cluster; and from what we know of the economy of the hive, we would expect the bees to change position in the cluster from time to time. If this cannot be readily done the bees on the outer sides may become restless and uneasy, and communicate this to the other bees, to the injury of all.

Comb Foundation in Sections. In connection with the production of comb honey, a very thorough and extensive test was made with comb foundation of different sizes in the sections. The results go to show that it is of very great importance that the sections should be filled to sides and bottom with comb foundation. Anything less increases the number of pop holes in the section, and even tends to prevent the comb from being fastened firmly to the sides or bottom wood.

Deep Cell Foundation. During the past year there has been put upon the market what is known as "Deep Cell" Foundation. It differs from ordinary comb foundation, in that it is flat bottomed instead of natural base, and the side wall is thin and one quarter of an inch deep or thereabouts. Thinking that this deep cell foundation would have a tendency to draw the bees into the sections and save them work, we decided to test it. It arrived too late to make a thorough test, but when placed in the hive with four other grades of foundation, and in no more favorable location, it was the first section the bees began to cap In a section $4\frac{1}{4}$ x $4\frac{1}{4}$ inches we found two cells in which the bees thickened the base of the comb to give it the shape of the natural comb, thus increasing the wax in the section. If much of this was done it would prove a decided objection.

In comparing weights of comb foundation we found that running about twelve square feet to the pound to be most readily accepted by the bees; when thinner there is a greater tendency for the bees to gnaw it and cut pop holes.

So far the work in our apiary would lead us to recommend the following in the production of comb honey:

Full-sized separators not slotted.

A bee space above the section.

A double bee space and divider between the side of the hive and the first tier of sections.

A full sheet of comb foundation, about twelve feet to the pound.

A wedge between the bottom board and the side of the hive.

Carniolan Bees During the fall of 1896 we received two dozen tested Carniolan Queens, and introduced them to colonies of bees made queenless for the purpose. This was done in the latter part of July and August, in ample time to give the colonies time to develop a large number of these bees to go into winter quarters. It was our intention to test these bees in a general way, but, owing to the conflicting reports as to their tendency to swarm, we decided to test them, first of all, as to their disposition in this direction.

First, let me say that more than ordinary precaution was taken to give the hives shade and ventilation, particularly the latter; and room was given, as far as conditions and circumstances would warrant. The swarms from twelve of the colonies were placed in hives with only foundation starters in the frames, while the other twelve were given frames containing full sheets. I may say that in general we found the bees very gentle; they built up well in the spring; and the only point I could detect in which they were inferior to the Italian, was that the queen, being black, there was much greater difficulty in finding her in the hive.

The swarms put upon full sheets of foundation did not exhibit any undue tendency to swarm; but those hived on starters swarmed excessively and built exceedingly poor comb. Herewith will be found an engraving of seven combs out of eight in a

brood chamber; the eighth comb was entirely drone comb. At the stage of building herein illustrated the bees swarmed again, and the instance illustrated was not at all isolated. The result of the experiment must of course be received with caution; but thus far, without full sheets of foundation, the Carniolans have shown themselves a decided failure. They do not appear to build a proper proportion of worker comb, and the building is done very irregularly, but this deficiency seems to be overcome when the foundation of the comb is supplied. In the meantime we would advise bee-keepers not to be in any hurry to introduce the Carniolan bees until another season's test can be made.

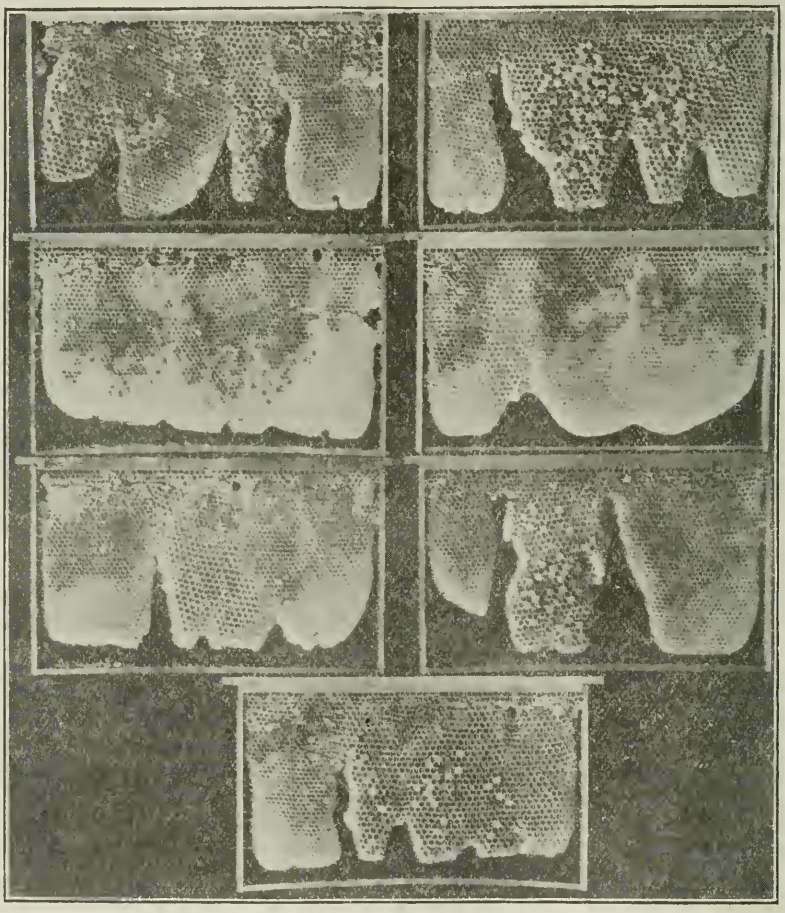


Fig. 4.—Comb from Carniolan bees, with starter foundation.

Foul Brood. Having, during the season of 1896, rendered Mr. F. C. Harrison, B.S.A., College Bacteriologist, what assistance we could in securing material with which to carry on investigations in connection with the disease known by bee keepers as "Fou Brood" (Bacillus Alvei), Mr. Harrison during that season continued his investigations in connection with the disease.

This year the experiment with comb foundation made of bees-wax infected with the germs of foul brood was repeated on a more extensive scale. Mr. Harrison made cultures of the germ; and, instead of incorporating these in the melted wax and then re-melting the wax to make it into comb foundation, he sent the wax to the makers of

this article and had the germs incorporated in it when it was made up, thus managing to have one melting less than last year. The wax was barely melted and at once cooled. Six hives were prepared and given full sheets of this infected wax, and at the close of the season there was not a trace of disease in the hives. The colony put upon such infected comb foundation last year was entirely free from the disease this year. We should like to pursue investigations in feeding medicated syrup to colonies infected by foul brood with a view to effecting a cure, but to do this under normal conditions it would be necessary to take the diseased colonies to some isolated district, in some of the more sparsely settled parts of the Dominion. We hope in another season to be able to co-operate with Mr. Harrison in this matter.

Although Mr. Harrison has a great deal of work to do, I understand he has kindly consented to test different samples supposed to be foul brood. They should be sent carefully packed, by sample post. Those in doubt about the disease will now have an opportunity of satisfying themselves, as the bacteriological test can be relied on as absolutely accurate in every case. With a decrease in the number of cases, it may be practicable to have bacteriological tests made whenever the owner of the bees has doubt as to the genuineness of a case.

The Condition of the Brood Chamber in Early Spring. Those who are known as our most advanced and progressive bee-keepers (and many of the more conservative) have advocated leaving the brood chamber of the hive undisturbed during the cold and changeable weather of spring, even to leaving untouched the sealed quilts shown on the hive, to prevent as far as possible the escape of the warm air.

With great reluctance we decided during the past spring to make a series of extensive experiments as to the effect certain conditions would have upon the amount of brood reared in the hive. The first bees were set out on the eleventh of March ; and the remainder at varying intervals during the next three weeks. The results from the various settings out showed a very marked difference—so much of a difference, in fact, that, in almost every case, after examining the brood chamber, we could tell the date of setting out. Upon examination of the colonies when first placed on their summer stands, brood was found in only one or two hives, and these showed indications of imperfect wintering. The inspection at that time went to show that in healthy cellar wintering there is no brood rearing. The day the bees were set out they had an exciting and cleansing fly, after which the queen began to deposit eggs and kept this up for a day or two, unless followed by weather suitable for flying. During the past spring, owing either to continuous low temperature or wet weather, the bees were confined for as long as a week at a time. The different stages of brood in the hive, upon inspection, gave indication just when the bees were ready to fly, the stimulus from flight, aided probably by the increased temperature, having a marked effect. Some colonies were fed diluted honey by means of a feeder above the brood chamber ; the results were very beneficial, and the brood chamber under this condition was enlarged by the bees. Great care, however, should be taken not to over-estimate the value of one season's work.

The spring of 1897 was exceptional ; the weather was too wet and cold to allow the bees to fly, and yet not cold enough to make it likely that the brood would chill in the hive. Another season, with more frequent opportunities to fly and greater extremes of temperature, with feeding added, there might be the danger of enlarging the brood chamber to such an extent that, during cold days and nights, a portion of the brood might chill to the great injury of the colony.

Moving Bees for Fall Pasture. Upon referring to the report of the last two years, it will be seen that it paid well to move a certain number of colonies a distance of about ten miles to fall pasture. This year, after the clover and linden flow was over, we moved one hundred and fifty-five colonies to fall pasture. The season was unfavorable, and, although the bees made a very good showing for a short time, the crop secured barely paid the expense of moving them. Taking the average for the three years we find that this plan has paid. Taking the fall of 1897 alone, and considering the

risk, trouble and expense of moving the bees, the returns received would not warrant a repetition; but during the other seasons better results have been obtained and the average would justify continuing the work.

Do Bees Move Stores from the Brood Chamber to the Super? About two years ago a bee-keeper, recognized as a leader in his profession, wrote an article in one of the leading United States bee journals upon feeding bees sugar syrup in the spring of the year and by this means crowding the brood chamber, the object being to compel the bees to store all the honey they gathered in sections in the super. Some did not hesitate to venture the opinion that the bees when given super room, would carry a portion of the sugar syrup into the sections and in this way make an adulterated article of the produce put upon the market; others thought not, as the quantity thus taken up would not be large, but as the appliances for readily detecting adulteration were not within easy reach of the practical bee-keeper, a definite answer could not be given. The matter was not allowed to rest, however, and our experimental apiarian was asked to make a test. About the middle of May ten strong colonies were purchased, and the combs in the brood chamber contained in every instance an abundance of brood and stores. The latter consisted entirely of dark honey, almost exclusively of buckwheat honey gathered the previous autumn. When clover opened, extracting supers were put on the hives with a queen excluder between the supers and the brood chamber, and the results were as follows: Upon removing and holding the combs to the light, the contents of many appeared dark. Upon uncapping these combs the honey underneath was amber in color, and the flavor unmistakably buckwheat. This was the case in seven out of the ten supers. No buckwheat being in blossom during the early clover flow, the bees must have carried the buckwheat honey from the brood chamber. This should be very conclusive evidence that when the brood chamber becomes crowded, before the supers are placed on the hive, the bees are likely to remove a portion of the store from the brood chamber. Their object, in all probability, being to make more room for brood.

In the above there is another lesson for the practical bee-keeper. By this carrying up about 270 pounds of first-class honey was deteriorated to the extent of about three cents per pound. In the production of comb honey extracting supers should first be put on, to allow the bees to store this dark honey in the extracting comb; and after they have ceased to carry up the dark honey the sections should be put on and the mixture extracted. The above directions are given because it is not practical to remove the dark honey from the sections. If it is the intention to produce extracted honey it should be removed from the extracting supers when the bees appear to have ceased carrying up the dark honey; by so doing a smaller percentage is deteriorated. At the present time many bee-keepers allow the dark and light honey to be mixed, as described above, and do it at a financial loss.

The Production of Comb Honey. To improve the finish of comb honey taken in the Province is an important matter. To get a well finished section improves the appearance of the honey, increases the demand, puts it in a better shape for the inexperienced retailer to handle, and makes it less liable to break out of the wood when jarred in shipping. A repetition of the experiment in the production of comb honey will be of interest and practical value, as, during the previous year's work, the main objects in view were:

1st. To compare the number and size of pop holes in the sections of supers with the bee space above, and of those without. Those without, had a quilt or board next the sections; those with, had a board with quarter inch bee space over the supers, between the board and the sections.

2nd. To compare comb honey having the face of the last section and wood sides of supers separated by only the usual bee space, and those having two or more bee spaces. The two or more bee spaces were secured by means of dividers of different construction. Some were of solid boards very thin, with holes three-eights inch in diameter. During the season of 1896 they were of wood only, but during 1897 we used some of wood and others of metal. The bee space was quarter inch in every case.

During 1897 we also tested, in connection with the above experiment, a wedge placed at each side of the hive, and between the bottom board and brood chamber, the wedge being seven-eights inch square at the end next the entrance and tapering to a feather edge by seven-eights inch at the other end.

The following is the result of a group of seven colonies with cloth or board and no bee-space over the sections compared with seven having a quarter inch bee space above :

Those without the bee-space had decidedly more pop holes in the sections ; there was also decidedly more propolis about them. Where pop holes existed, in those having no bee space above, they were much larger.

The result of seven colonies with the perforated divider and one bee-space between it and the wall of the hive, and those without the divider and additional bee-space :

The sections in the tier next the outside of the hive were much better filled where the divider and extra bee-space were used. In addition to the repetition of last year's work, in a number of cases perforated metal was used in place of the divider of wood, and in no case did there appear to be any difference between the metal and the wood divider. The metal has, however, the advantage that it can be thrown into a weak solution of lye and cleaned, lasting for an indefinite time. This cannot be done with the wood.

Our object was two-fold in trying the wedges between the sides of the bottom board and the sides of the brood chambers. First, to increase the facilities for ventilating the hive ; next, to compel the bees to go to the sides and end of the hive when coming in to unload honey. While we found them of great value in ventilating the hive, we are not prepared to say just to what extent the wedges assist in filling the outside sections. A more thorough test will be made of this next season.

Pure Air, Ventilation, and Artificial Heat in the Wintering of Bees. During the summer of 1895 I had the good fortune to visit the apiaries and home of one of our foremost and most enterprising Canadian Bee-keepers, Mr. C. W. Post, of Trenton, Ont. Mr. Post expressed great confidence in artificial heat for cellar wintering. He was kind enough to give his ideas and the system he thought it well to follow ; and, as a result, a very thorough test was made during the winters of '95-6 and '96-7.

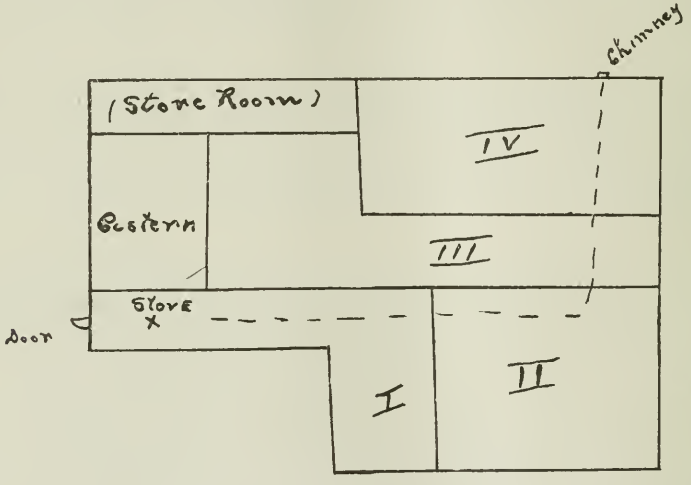
I am perfectly well aware that a great many have used fresh and pure air in the wintering of bees, and with more or less success. I am also aware that artificial heat has been applied. The instances on record are, however, less frequent ; and I do not know of anyone who for a series of years has made a success of this ; nor do I know of anyone who is constantly using artificial heat and fresh air to replace the air made impure by the bees. A combination of these should lead to success. In the application of pure air, the great difficulty has been regularity of current and temperature. When cold outside, it is necessary to exclude or partially exclude outside air to keep the cellar the proper temperature, and this we know leads to foul air. If the cold fresh air is allowed to enter, the temperature falls ; and the bee keeper is often at a loss to know which of the two evils is the lesser.

Again, when the outside temperature is about the same as the inside, there is a tendency to stagnation ; the atmosphere in the cellar becomes vitiated ; the bees are correspondingly restless and proportionately worn out and aged. Sub-earth ventilation has been tried ; but in this the above difficulties have presented themselves to a greater or less degree ; and many have tried these methods for a time, only to abandon them in the end.

To cheer and comfort the fraternity (if comfort can be derived by having brethren in tribulation), I may say, in passing, that Dairymen who require accurate temperatures and degrees of moisture in ripening cheese have experienced all our perplexities, and the more advanced in that calling are studying the question as we are. What we require is to be able to control temperature, and to secure a cheap and practical power

by means of which we can secure a steady ventilation or, in other words, draw or push atmosphere. For some years my thought ran in the direction of electricity; and, although it is not yet within the range of the practical, I believe that the time is not far distant when by a system of storage batteries we can, at a nominal outlay by wind mills, produce electricity which can be used as required for power, heat, and light; and by means of electric carrents, ventilators will open and shut, and heat be applied or cut off automatically as the temperature rises and falls in the cellar. For the present we have the power to force currents in whatever direction we may desire by means of artificial heat. The same heat also serves to regulate the temperature; and here we have a theory that is practical.

The first test was conducted under the following conditions: A large stone cellar was divided into five parts, four of which were used for the bees, and these repositories communicated with one another by means of doors, and also by means of openings fourteen inches square near the top of the room; and through these openings a pipe ran. The size of the pipe was six inches. The remainder of the openings, of course, allowed a circulation of air from one room to another. (See plan below.)



A "Tribune" stove was placed near the cellar door, which communicated with the outside; and through this door the fresh air from the outside had access The air in its natural course, by means of the openings around the stovepipe, passed from room to room; and finally in the fourth room passed out by means of a similar opening in the chimney,—the same chimney into which the regular pipe entered. This chimney has, in addition, a pipe entering it from the stove used in the living room above.

The fuel used at first was wood; but the pipe was too hot and irregular, and gave out more or less odor, particularly the last portion which became cool before entering the flue. Stove coal was subsequently used for 3½ months—2,550 pounds having been consumed.

There were 70 colonies in number one, 75 in number two, 80 in number three, and 75 in number four. The bees were put in number one on October 26th, in number two on November 20th, in number three on November 21st, and in number four on November 22nd.

In the records (with one exception) the variations in temperature were very slight. The night of February 14th the fire went out, and the next morning the cellars registered as follows: number one, 38 degrees; number two and three, 40 degrees; and number

four, 42 degrees. You will notice that the temperature was raised by the bees as it passed from cellar to cellar. There was a wet and dry bulb thermometer in each, and the temperature half way between the floor and ceiling was as follows:

	Dry.	Wet.
1	46	43
2	45	43
3	45	43
4	46	45

The difference in temperature at top and bottom of number two was three degrees, and in number four, six degrees. In number four there was a fire in the room above; in number two this was not the case. I draw attention to this, as some may not consider these variations sufficient when taking the temperature of a cellar. You will notice that number one and four, dry bulb, both stood at 46 degrees; but the wet in number one, the first cellar into which the pure air passed, stood at 43 degrees, and number four at 45 degrees. Into this the air went after passing through the other three cellars, the added moisture we would expect being expelled by the bees from the previous cellars. Moisture and temperature were taken; but how about the impurity? I think I can give several practical proofs that pure air is an important factor—at least the weight of evidence tends to show this.

The bees in number one cellar appear to be quieter than in number four. Though a lamp burned for half an hour in number one, the bees did not fly to the light. In number four, although they did not fly to the light to any great extent, there was a tendency in this direction. In fact, all through the winter they were more restless in the last cellar; and, to prevent injury to the bees, fresh air from another source was allowed to enter number four cellar.

There was no perceptible difference in the first three cellars. The bees could be seen clustering quietly in number one, some of the hives being within seven feet of the stove. A thorough inspection was made March 19th,—the contents of the hive were examined at the entrance, and, upon lifting cushions and quilts when possible, not the slightest indication of mould or dampness could be detected. Only two colonies showed the least sign of dysentery; and these bees whose queen had shown symptoms of this disease the winter before, and were kept purposely to see if they would have it again.

Number one cellar contained 60 colonies with bottom boards as on their summer stands, and entrance full width. Fifteen had two inch rims placed under the brood nest. Number two contained fifty hives with the back ends of the hives three inches higher than the front, and the brood chamber three eights inch from the bottom boards; and 25 colonies had two inch rims under the brood nest. Number four had 75 colonies with all the back of hives raised three-eights inch from bottom boards. All the hives were covered with cloth, and over the cloth there was one inch of sawdust. The bees were placed on their summer stands on April 7th, 8th, 9th, and 11th. As to method of adjusting entrances and bottom boards, there appeared to be no great difference in results. With the exception of several starved and mice-destroyed colonies, every one came through alive and in good condition.

The indications of good wintering were:

1st. Their quiet condition.

2nd. Bees clustered compactly.

3rd. Individual bees did not fly to the light of the stove, lamp or outside door, through which the fresh air had access.

4th. There was no brood in the hives when placed on their summer stands.

The air passing from cellar to cellar is not a condition to be desired; but it serves as a splendid object lesson to the bee keepers of this country, and emphasizes, as no other experiment could, the desirability of having pure air. A similar experiment was tried during the winter of 1896 and 1897, and with similar results.

There is one point which I wish to emphasize, and an additional experiment during the past winter goes to show its importance. The chimney into which the foul air passes must be what we call a live chimney; it must have a pipe with hot air constantly passing into it. Why? Because in this way we secure the power necessary to make the current travel one way in the chimney. We know that cold air will rush into warm, and the variations in temperature cause the movement of atmosphere. Last winter I arranged another cellar with the same method in view. The stove was boxed in a compartment about four feet square, as air tight as matched lumber, felt paper and sheet iron could make it. A shaft of fresh air opened under the stove and half way between the ceiling and floor; and at opposite sides, two pipes led into bee cellar—the pipes discharging pure atmosphere along the cellar walls. I could not reach a live chimney, so I put the foul air pipe outside of and about the stove pipe, making a double pipe, thinking that the heat from the stove would act as a sufficient motor to secure a steady current of air. During cold weather everything worked well, but when the fire was low there was not sufficient heat in the pipe, and the atmosphere became stagnant, or the current was reversed, and instead of the foul air being carried off by the pipe the cool air rushed down the ventilating pipe, and into the cellar without passing through the heating compartment.

The direction of a current can readily be detected by means of a sheet of paper held close to the opening. The sheet of paper will be drawn in the direction of the current. There were slight symptoms of dysentery in some; one colony was found dead and taken out, and one was queenless. Altogether it was an improvement on irregular ventilation, but not satisfactory.

During the past autumn we made some slight but important changes in the method of ventilating. The stove pipe, instead of passing through the bee cellar, passes up stairs from the hot air compartment. The capacity of the fresh air pipe has been increased three-fold; and a pipe from the latter has now been carried directly into the bee cellar, so that all the fresh air need not be carried through the hot air compartment. The object of the above is to keep a hotter and steadier fire, and yet be able to keep the temperature down in the bee cellar. This is a matter of very great importance. A good colony of bees, taking one year with another, will more than double itself; yet the winter mortality is so great that the total increase in bees kept in Ontario has been very gradual during the last ten years.

Respectfully submitted,

R. F. HOLTERMANN,
Apiculturist.

Brantford, Dec. 31st, 1897.

PART XIV.

REPORT OF THE PHYSICIAN.

To the President of the Ontario Agricultural College:

SIR,—I have the honor of presenting to you my report for the present year, which I regret to say has been marked by the occurrence among the students of more sickness than any previous year since I became connected with the College.

This statement applies especially to the winter and spring months during which many suffered from "colds," "sore throats," and other ailments of a slight nature, and a few from minor accidents. During these months we also had two cases of typhoid fever, which ran a mild course in each instance. Both were removed to the General Hospital in this city, where they remained under my care until they were removed.

In the month of February, mumps appeared amongst the students and thirty-five or more of them suffered from the disease. Just after the Easter vacation, an outbreak of measles occurred and nine of the students contracted this illness. Some of the cases were very severe. All were removed to the two hospitals of this city, where I continued to attend them, and where, under the skilful nursing of these excellent institutions, all made good recoveries.

The present term opened with an attendance of 146 students—the largest class, I understand, in the history of the College. As in previous years, I carefully observed the by-laws in respect to their examination on admission and in respect to my visits.

The sanitary conditions of the College, as they always have been, are excellent, and it is gratifying to be able to state that no illness could be traced to any defects in that respect.

Sickness amongst the students increases largely the care and work of the matron, and I feel that I cannot conclude my report without speaking in the highest praise of her earnest and unremitting attentions to their comfort in sickness and in health.

Respectfully yours,

WM. O. STEWART,

College Physician.

Guelph, Ont., Nov. 27th, 1897.

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APPENDIX I.

GRADUATES, ASSOCIATES, AND COLLEGE ROLL.

1. Graduates.

Bachelors of the Science of Agriculture (Degree of B.S.A.), 76.

1896—Atkinson, J.

1893—Beckett, H. L.
1896—Bishop, W. R.
1893—Bell, L. G.
1890—Brodie, G. A.
1894—Brown, W. J.
1891—Buchanan, D.

1892—Carlyle, W. L.
1895—Christian, A. H.
1896—Clark, J. F.
1891—Cowan J. H.
1888—Craig, J. A.
1893—Crealey, J. E.
1888—Creelman, G. C.

1893—Day, G. E.
1890—Dean, H. H.
1895—Doherty, M. W.
1893—Dyer, W. D.

1893—Eaton, L. W.

1888—Fee, J. J.
1894—Ferguson, J. J.
1891—Field, H.

1897—Gamble, W. P.
1892—Gibson, D. Z.
1894—Graham, W. R.

1893—Harcourt, Robt.
1889—Harcourt, G.
1892—Harrison, F. C.
1891—Hewgill, E. A. (*ob*).
1897—Hodgetts, P. W.
1891—Hutt, H. L.
1889—Hutton, J. R.
1892—Hutchinson, J. W.

1894—Kennedy, P. B.
1895—Kennedy, W. A.
1896—Kidd, D. F.
1895—King, A. A.
1896—Knight, J. W.

1889—Lehmann, A.
1891—Linfield, F. B.

1897—Macdonald, J. C.
1896—Maconachie, G. B.
1892—Marsh, G. F.
1890—McCallum, W.
1894—McCallum, Wm.
1890—Monteith, S. N.
1889—Morgan, J. H. A.
1892—Morgan, R. N.

1892—Newcomen, W. F.

1897—Oastler, J. R.

1891—Palmer, W. J.
1897—Parker, F. A.
1888—Paterson, B. E.
1896—Paterson, T. F.

1889—Raynor, T.
1895—Robertson, G. A.
1897—Rogers, C. H.
1895—Rowe, G. F.

1890—Shantz, A.
1891—Sharman, H. B.
1893—Shaw, R. S.
1891—Sleightholm, J. A. B.
1894—Sleightholm, F. J.
1896—Smith, G. A.
1896—Smith, P. B.
1894—Spencer, J. B.
1893—Story, H.
1889—Soule, R. M. (*ob.*)
1893—Soule, A. M.

1896—Thompson, W. J.

1895—White, E. F.
1891—Whitley, C. F.
1895—Wiancko, A. T.
1895—Widdifield, J. W.
1896—Wilson, N. F.

1888—Zavitz, C. A.

2. Associates.

The total number of Associates up to the present time is 354, as follows:

1888—Austin, A. M.
1880—Anderson, J.
1880—Ash, W. E.
1893—*Atkinson, Jas.
1892—Aylesworth, D.

1881—Ballantyne, W. W.
1879—Bannard, E. L.
1888—Bayne, S. R. S.
1897—‡Beam, E.
1892—†Beckett, H. L.
1892—Bell, L. G.
1896—Bell, T. C.
1888—Birdsall, W. G.
1888—Bishop, W. R.
1896—Black, G. W.
1889—*Brodie, G. A.
1890—Brown, H. H.
1892—Brown, B. C.

1890—Buchanan, D.
1894—Buchanan, John.
1888—Budd, W.
1885—‡Butler, G. C.
1896—Butler, W. E.
1884—Black, P. C.
1882—Blanchard, E. L.
1886—Broome, A. H.
1886—‡Brown, C. R.
1888—Brown, S. P.
1893—Brown, W. J.
1892—Burns, J. A. S.
1893—Burns, J. H.

1886—Calvert, S.
1890—Campbell, C. S.
1877—Campbell, J. A.
1880—Campbell, D. P. L.
1896—Campbell, W. G.

1892—Carlaw, W.
1891—Carlyle, W. L.
1884—*Carpenter, P. A. (*ob.*)
1888—Carpenter, W. S.
1892—Carpenter, F. C. S
1894—Carrick, C. S.
1895—Cass, L. H.
1895—Chadsey, G. E.
1896—Charlton, E. S.
1880—Chapman, R. K.
1882—Charlton, G. H
1882—Chase, O.
1894—Christian, A. H.
1897—Clark, G. H.
1879—Clark, J.
1895—*Clark, J. F.
1879—Clinton, N. J.
1880—Clutton, A. H.
1886—Cobb, C.

* Gold Medallist. † First Silver Medallist. ‡ Second Silver Medallist.

ASSOCIATES.—*Continued.*

1894—Cook, J. H.
1893—Cooper, W. W.
1893—Conn, Joseph.
1896—Cousins, R. J.
1890—Cowan, J. B.
1890—‡Cowan, R. E.
1887—Craig, J. A.
1897—*a*Craig, R. D.
1892—Crealey, J. E.
1887—Creelman, G. C.
1878—Crompton, E.
1896—Cunningham, J.

1878—Davis, C. J.
1880—Dawes, M. A.
1882—Dawson, J. J.
1892—*Day, G. E.
1888†Dean, H. H.
1893—Dean, Fred,
1882—Dennis, J.
1889—Derbyshire, J. A.
1896—Devitt, I. I.
1881—Dickenson, C. S.
1894—Doherty, M. W.
1890—Dolsen, W. J.
1887—Donald, G. C.
1887—Donaldson, F. N.
1877—Douglas, J. D.
1894—Duffett, G. P.
1877—Dunlop, S.
1895—Dunn, E.
1892—Dyer, W. D.

1892—Eaton, L. W.
1895—Edelsten, E. J. M.
1890—Elliott, R.
1894—Elliott, Wm.
1897—Elliott, W. J.
1893—Elmes, W. A.
1888—Elton, C. W.
1888—Elton, R. F.
1882—Elworthy, R. H.
1887—Ewing, W.

1890—Fairbairn, O. G.
1897—Fairweather, F. H.
1878—Farlinger, W. K.
1886—Fee, J. J.
1893—†Ferguson, J. J.
1890—Field, H.
1881—File, J.
1882—Fotheringham, J.
1883—‡Fotheringham, W.
1879—Fyfe, A.

1896—Gadd, T. T.
1896—Gamble, W.
1883—Garland, C. S.
1889—Gelling, J. A.
1892—Gies, N.
1891—*Gibson, D. Z.
1887—Gilbert, W. J. (*ob.*)
1879—Gillespie, G. H.
1892—Graham, W R.
1878—Graham, D.
1879—Greig, G. H.
1881—Grindlay, A. W.
1896—Guy, J. T.

1890—Hadwen, G. H.
1891—Haight, W. L.
1882—Hallesy, F.
1893—Hamilton, C. A. W.
1892—Harcourt, R.
1888—*Harcourt, G.
1890—†Harcourt, J.
1887—Harkness, A. D.
1891—Harrison, F. C.
1888—Harrison, R. E.
1887—Hart, J. A.
1887—Hart, J. W.
1892—Harvey, W. H.
1888—Heacock, F. W.
1897—Heartz, W. B. G.
1894—Henderson, R. H.
1890—Hewgill, E. A. (*ob.*)
1896—*Higginson, G. O.
1894—High, A. M.
1896—†Hodgetts, P. W.
1890—Holliday, W. B.
1886—Holtby, R. M.
1880—Holtermann, R. F.
1892—Honsberger, J. D.
1882—Horne, W. H.
1888—Horrocks, T. J.
1887—Howes, J. S.
1882—Howitt, W.
1892—Hurley, T. J.
1893—Husband, E. M.
1890—*Hutt, H. L.
1896—Hutton, H.
1888—Hutton, J. R.

1886—Idington, P. S.

1886—Jeffrey, J. S.
1883—Jeffs, H. B.
1879—Jopling, W.

1896—Kennedy, A.
1894—‡Kennedy, W. A.
1893—Kennedy, P. B.
1894—Kidd, D. F.
1894—King, A. A.
1895—Kipp, A.
1895—Knight, J. W.
1888—Knowlton, S. M.

1894—Lailey, F. T.
1894—Laird, J. G.
1882—Lansborough, J.
1895—†Lang, L. W.
1887—Leavens, D. H.
1896—Leavitt, A. S.
1893—Lehmann, R. A.
1884—‡Lehmann, A.
1887—§Lick, E.
1877—Lindsay, A. J.
1889—†Linfield, F. B.
1887—Livesey, E. M.
1897—Lloyd-Jones, T.
1880—Lomas, J. W.
1878—Logan, T.
1896—Loghrin, S. M.
1897—Lucas, W. T.

1880—Macaulay, H.
1896—McDonald, J. C.
1890—Macfarland, T. W. R.
1886—Macpherson, A.
1886—*Madge, R. W.
1882—Mahoney, E. C.
1882—Major, C. H.
1889—Marsack, F.
1889—Marsack, H. A.
1891—Marsh, G. F.
1877—Mason, T. H.
1890—McKergow, J. G.
1877—Myer, G. W.
1897—Mooney, J. A.
1897—Morgan, G. W.
1887—Morgan, J. H. A.
1881—Motherwell, W. R.
1885—†Muir, J. B.
1897—*McCalla, G. B.
1895—McCallan, E. A.
1887—McCallum, E. G.
1893—‡McCallum, W.
1895—McCallum, W.
1895—McConachie, G. R. B.
1893—McCrimmon, W. D.
1895—McCullough, H. A.
1889—McEvoy, T. A.
1895—McGillivray, J. W.
1885—McIntyre, D. N.
1885—McKay, J. B.
1886—McKay, J. G.
1893—McKenzie, W. G.
1891—McKenzie, A. G.
1897—McKinley, W. W.
1889—McLaren, P. S.
1893—McMordie, R.
1897—McMillan, M. J.
1893—McNaughton, K.
1895—McPhail, J. D.
1883—McPherson, D.
1890—Monk, W. O.
1889—Monteith, S. N.
1891—‡Morgan, R. N.
1890—Mulholland, F.

1878—Nasmith, D. M.
1891—Newcomen, W. F.
1879—Nichol, A. (*ob.*)
1882—Nicol, G.
1882—Notman, C. R.

1896—‡Oastler, J. R.
1877—O'Beirne, A. C.
1887—Orsman, C. P.
1886—Owen, W. H.

1888—Palmer, W. J.
1896—Parker, F. A.
1887—Paterson, B. E.
1895—‡Paterson, T. F.
1895—Payne, G. Y.
1883—Perry, D. E.
1891—Perry, E. C.
1893—Phin, A. E.
1881—§Phin, R. J.
1881—Phin, W. E.
1881—Pope, H.
1886—Power, R. M.
1884—Powys, P. C.

1882—‡Ramsay, R. A.
1879—Randall, J. R
1885—Raynor, T.
1897—‡Reade, J. M.
1885—Reid, P.
1894—Reinke, C. E.
1889—Randall, W.

a First in competitions for medals but ruled out by special regulation.
* Gold Medallist. † First Silver Medallist. ‡ Second Silver Medallist.
§ Winner of the Governor-General's Medal—the only medal given that year.

ASSOCIATES.—*Concluded.*

1889—Rennie, E. A.
1897—Richardson, E. L.
1883—*Robertson, W.
1879—Robertson, J.
1894—†Robertson, G. A.
1897—Robertson, T. H.
1881—Robins, W. P.
1879—Robinson, C. B.
1896—Rogers, C. H.
1893—Roper-Curzon, A. C. H.
1892—Roper-Curzon, S.
1881—Ross, J. G.
1897—†Ross, H. R.
1897—Ross, M. N.
1897—Ross, N. M.
1894—Rowe, G. F.
1892—Ruthven, W. A.

1884—Saxton, E. A.
1888—Serson, W. E.
1892—*Shaw, R. S.
1888—Sinclair, J. J.
1882—Silverthorne, N.
1894—Simpson, A. E.
1892—‡Soule, A. M.
1882—‡Soule, R. M. (*ob*)
1896—Stoddart, R. L.
1877—Sykes, W. J.
1883—Schwartz, J. A.
1887—†Scrugham, J. G.
1888—Shantz, A.
1887—Sharman, H. B.
1887—Shaw, G. H.
1882—†Shuttleworth, A. E.
1892—Silverthorn, C.

1884—†Slater, H. (*ob.*)
1887—*Sleightholm, F. J.
1890—Sleightholm, J. A. B.
1885—Smith, E. P.
1895—Smith, G. A.
1895—Smith, P. B.
1894—Smyth, F. L.
1892—‡Soule, A. M.
1891—Sparrow, J. C. H.
1893—Spencer, J. B.
1891—Spencer, W. A.
1897—Squirrell, W. J.
1884—Steers, O.
1888—Stevenson, C. R.
1893—Stewart, J.
1878—Stewart, W.
1892—Story, H.
1882—Stover, W. J.
1886—†Sturge, E.
1897—*b*Summerby, W. L.
1888—Sweet, H. R.

1895—Taylor, W. H.
1891—Thompson, R. A.
1895—Thompson, W. J
1889—‡Tinney. T. H.
1892—Tolton, J. E.
1879—Toole, L.
1883—Torrance, W. J.
1884—Tucker, H. V.
1895—Tye, C. W.
1885—Thompson, W. D.

1888—Valance, R. (*ob.*)
1894—Vipond, J. M.

1879—Warnica, A. W.
1884—Wark, A. E.
1878—Warren, J. B.
1890—Webster, F. E.
1880—§Webster, J. L.
1879—Wells, C.
1890—Wells, E.
1897—West, A. W.
1882—*Wettlaufer, F.
1894—*Wheatley, Jno.
1895—Whetter, J. R.
1891—White, E. F.
1882—White, C. D.
1879—White, G. P.
——Whitley, C. F.
1892—Wiancko, A. T.
1894—Widdifield, J. W.
1891—†Wilkin, F. A.
1879—Wilkinson, J. P.
1888—Willans, T. B.
1888—Willans, N.
1879—Willis, J.
1883—†Willis, W. B. (*ob.*)
1888—Willmott, A. B.
1895—Wilson, A. C.
1896—Wilson, A. F.
1890—Wilson, F. G.
1894—Wilson, E. E.
1895—Wilson, N. F.
1897—Winchester, G.
1890—Wood, W. D.
1884—Wroughton, T. A.

1892—Yuill, A. R.

1886—Zavitz, C. A.

* Gold Medallist. † First Silver Medallist. ‡ Second Silver Medallist.
§ Winner of the Governor-General's Medal—the only medal given that year.
b Third in competition for medals but ruled out by special regulation.

3. COLLEGE ROLL FOR 1897.

Third Year Students.

Name.	P. O. Address.	County, etc.
Beam, E	Black Creek	Welland, Ont.
Bell, T. C	Cataract	Peel, Ont.
Butler, W. E	Dereham, Centre	Oxford, Ont.
Cass, L. H	L'Orignal	Prescott, Ont.
Clark, G. H	Cainsville	Brant, Ont.
Craig, R. D	Guelph	Wellington, Ont.
Cunningham, J. A	Ardtrea	Simcoe, Ont.
Davis, A. N	Cayuga	Haldimand, Ont.
Elliott, W. J	Seaforth	Huron, Ont.
Gamble, W. P	Cumberland	Russell, Ont.
Heartz, W. B. G	Halifax	Nova Scotia.
High, A. M	Courtland	Lincoln, Ont.
Hodgetts, P. W	St. Catharines	Lincoln, Ont.
Hutton, H	Toledo	Leeds, Ont.

College Roll for 1897.

Third Year Students.—Continued.

Name.	P. O. Address.	County, etc.
Mooney, J. A	Inverness	Megantic, P.Q.
Morgan, G. W	Kerwood	Middlesex, Ont.
McCalla, G. B	St. Catharines	Lincoln, Ont.
Macdonald, J. C	Lucknow	Huron, Ont.
Oastler, J. R	Featherstone	Parry Sound District, Ont.
Parker, F. A	Bowmanville	Durham, Ont.
Robertson, T. H	Kingston	Frontenac, Ont.
Rogers, C. H	Grafton	Northumberland, Ont.
Ross, H. R	Gilead	Hastings, Ont.
Ross, M. N	Warrington	England.
Ross, N. M	Warrington	England.
Squirrell, W. J	Guelph	Wellington, Ont.
Summerby, W. L	Russell	Russell, Ont.

Second Year Students.

Allison, J. B	Adolphustown	Lennox, Ont.
Anderson, J. B	St. Marys	Perth, Ont.
Cutler, E. B	Arkona	Lambton, Ont.
Deike, H. V	Guelph	Wellington, Ont.
Fairweather, F. H	Alma	Wellington, Ont.
Fowler, R. C	Emerald	Lennox, Ont.
Golding, H. E	Thamesford	Oxford, Ont.
Grisdale, J. H	Russell	Russell, Ont.
Hammell, W. H	Beeton	Simcoe, Ont.
Harris, C. H	Rockwood	Wellington, Ont.
Hawke, A. H	Winnipeg	Manitoba.
Hollis, J. H	Shelly Bay	Bermuda.
Hopkins, A. G	Highfield	York, Ont.
Hume, H. H	Marvelville	Russell, Ont.
Hutchinson, L. W	Aurora	York, Ont.
Hutt, W. N	Southend	Welland, Ont.
Jarvis, C. D	Guelph	Wellington, Ont.
Jarvis, T. D	Guelph	Wellington, Ont.
Kennedy, W. J	Vernon	Carleton, Ont.
Livingstone, J. M	Sarnia	Lambton, Ont.
Lloyd-Jones, T	Burford	Brant, Ont.
Lucas, W. T	Bailieboro	Northumberland, Ont.
Mallory, F. R	Frankford	Hastings, Ont.
Marshall, F. R	Westbrook	Frontenac, Ont.
Murdoch, G. H	Bobcaygeon	Victoria, Ont.
McKinley, W. W	Seeley's Bay	Leeds, Ont.
McLaurin, J. D	Vankleek Hill	Glengarry, Ont.
McMillan, M. J	Newmarket	York, Ont.
Nicholson, R. G	Montreal	Quebec.
Price, W. J	Marsville	Dufferin, Ont.
Raynor, M	Rose Hall	Prince Edward, Ont.
Reade, J. M	Toronto	York, Ont.
Richardson, E. L	Toronto	York, Ont.

College Roll for 1897.

Second Year Students.—Concluded

Name.	P. O. Address.	County, etc.
Robertson, M	Meaford	Grey, Ont.
Ross, D. A.	Martintown	Glengarry, Ont.
Scott, N. E	Kingston	Frontenac, Ont.
Snider, C. H	Attercliffe	Lincoln, Ont.
Taylor, G. R	Harley	Brant, Ont.
Thomson, G. T	Blenheim	Kent, Ont.
Tozeland, J. H	Killarney	Manitoba.
Wallace, H	Hamilton	Wentworth, Ont.
Wagg, A. J	Mindemoya	Manitoulin Island, Ont.
West, A. W	Shelly Bay	Bermuda.
Westgate, H. P	Watford	Lambton, Ont.
Whigham, R. D	London	England.
Williams, W. E	Clandeboye	Middlesex, Ont.
Wilson, E. S	Dundas	Wentworth, Ont.
Zavitz, H V	Coldstream	Middlesex, Ont.

First Year Students.

Allison, J. B	Pakeham	Lanark, Ont.
Avent, P	Lechlade, Swinton	England.
Baird, G	Birnam	Lambton, Ont.
Balfe, J. J	Lombardy	Leeds, Ont.
Balfour, T. B	Amherstburg	Essex, Ontario.
Baker, W. G	Easton	Washington, Co., N.Y.
Ball, C. S	Toronto	York, Ont.
Ballard, C. P	Burford	Brant, Ont.
Bancroft, —	Newington	Stormont, Ont.
Bowers, J. C	Berlin	Waterloo, Ont.
Bowman, E	Bloomingdale	Waterloo, Ont.
Boyd, H. W	St. Chrysostome	Chateauguay, P.Q
Brokovski, A. J	Battleford	N. W. T.
Broomfield, R. J	Brechin	Ontario, Ont.
Bunny, B. H	Taunton	England.
Burnett, E	Kenmay	Scotland.
Calvert, E	Owen Sound	Grey, Ont.
Campbell, J. D	Victoria Cross	King's Co., P.E.I.
Canning, B	Dunchurch	Parry Sound District, Ont.
Carleton, J. A	Avening	Simcoe, Ont.
Christie, A	Winchester	Dundas, Ont.
Clark, A	Smith's Falls	Lanark, Ont.
Coté, J. C	Ottawa	Carleton, Ont.
Crerar, A. H	Molesworth	Perth, Ont.
Crow, J. W	Ridgeville	Welland, Ont.
Dane, F. M	Yarmouth	Nova Scotia.
Day, E. E	Harrowsmith	Frontenac, Ont.
Dickenson, J. H	North Glanford	Wentworth, Ont.
Douglas, A	Montreal	Quebec.
Douglas, H. M	Vandeleur	Grey, Ont.
Durlac, H	Dundee	Scotland.
Eagle, J. F	Copetown	Wentworth, Ont.
Eddy, A. F	Marksville	Algoma, Ont.
Evoy, E. V	Bar River	Algoma, Ont.
Farley, W. J	Smithfield	Northumberland, Ont.
Fawell, L. C	De Cewsville	Haldimand, Ont.
Fitzgerald, L. P	St. Louis	Simcoe, Ont.
Forbes, C. W	Jeannette's Creek	Kent, Ont.
French, G. C	Prescott	Grenville, Ont.

College Roll for 1897.

First Year Students.—Continued.

Name.	P. O. Address.	County, etc.
Gardiner, W	Parry Sound	Parry Sound District, Ont.
Gethen, G	Grimsby	Wentworth, Ont.
Glasgow, R. J	Fingal	Elgin, Ont.
Goble, F. W	Woodstock	Oxford, Ont.
Goodchild, A	Craigleith	Grey, Ont.
Gorrell, G. H	Gore Bay	Manitoulin Island, Ont.
Griffeth, L	Byron	Middlesex, Ont.
Gzowski, G. V	Toronto	York, Ont
Hains, J. M	Montreal	Quebec.
Hamilton, A	Ravenshoe	York, Ont.
Hermon, F. B	Reddnersville	Prince Edward, Ont.
Hodgins, W. F	Waterloo	Waterloo, Ont.
Hodgson, T. H. H	Port Perry	Ontario, Ont.
Hood, W. N. H	Ashgrove	Halton, Ont.
Howson, J. W	Cavan	Durham, Ont.
Hutchison, J. R	Escott	Leeds, Ont.
Hutton, G	Easton's Corners	Grenville, Ont.
Judson, H. M	Elgin	Leeds, Ont.
Kitchen, J. B	Brooklin	Ontario, Ont.
Kidd, C	Cookstown	Simcoe, Ont.
Lester, H. A	Burford	Brant, Ont.
Lewis, E. R	Burford	Brant, Ontario.
Linklater, Wm	Stratford	Perth, Ont.
Marks, W. J	Schomberg	York, Ont.
Marshall, E. G	Guysboro'	Norfolk, Ont
Mason, W. J. E	Fenella	Northumberland, Ont.
Matheson, E	Kincardine	Bruce, Ont.
Meyer, C. E	Guelph	Wellington, Ont.
Meyer, G. W	Guelph	Wellington, Ont.
Meyer, L. C	Guelph	Wellington, Ont.
Milburn, G. E	Toronto	York, Ont.
Millson, A. W	Solina	Durham, Ont.
Moffett, J. F	Jordan	Lincoln, Ont.
Morrison, C. A	Brooklin	Ontario, Ont.
Mortimer, E	Leeds	Yorkshire, Eng.
Mortuseux, C. E. M	Quebec	Quebec.
Murray, J. K	Avening	Simcoe, Ont.
McCarthy. D. J	Norwood	Peterboro', Ont.
McCarvie, E. A	Oakwood	Victoria, Ontario.
McCrimmon, J. R	Vankleek Hill	Prescott, Ont.
McEwan, D	Lakeport	Northumberland, Ont.
McFiggins, A. J	Colborne	Northumberland, Ont.
McGregor, T. W	Fournier	Prescott, Ont.
McIntyre, G. A	Renfrew	Renfrew, Ont.
McKay, R. A	Woodville	Victoria, Ont.
McKnight, G. F	Owen Sound	Grey, Ont.
McMillan, E. J	New Haven	Prince Edward Island.
McPhadden, A	Dominionville	Glengarry, Ont.
Patterson, H. H	Jermyn	Peterboro', Ont.
Peters, C. R	Elmhurst	King's Co., N.S.
Picken, J. B	Montreal	Quebec.
Popham, W. B	London	England.
Reid, R. H	Reaboro'	Victoria, Ont.
Robertson, D. A	Dunsford	Victoria, Ont.
Robertson, J. A	Blantyre	Grey, Ont.
Robinson, F. H	Brampton	Peel, Ont.
Schooley, D. B	Poplar Hill	Middlesex, Ont.
Smith, F. G	Whitby	Ontario, Ont.

COLLEGE ROLL FOR 1897.

First Year Students.—Concluded.

Name.	P. O. Address.	County, etc.
Smith, J. H.	New Hamberg	Waterloo, Ont.
Semple, W. C	Tottenham	Simcoe, Ont.
Sheppard, C. B.	Toronto	York, Ont.
Standly, R. W	Grafton	Northumberland, Ont.
Steel, R. C.	Toronto	York, Ont.
Stewart, A.	Ivan	Middlesex, Ont.
Stott, L.	Wyevale	Simcoe, Ont.
Strachan, J. J.	Brussels	Huron, Ont.
Sullivan, H	Toronto	York, Ont.
Switzer, J. S.	Binbrook	Wentworth, Ont.
Taylor, J.	Todmorden	York, Ont.
Trueman, J. T	Kerwood	Middlesex, Ont.
Tupper, G. B.	Lynville	Norfolk, Ont.
Turner, F. P.	Bealton	Norfolk, Ont.
Thomson, H.	Magnetawan	Parry Sound District, Ont.
Wickham, W. C.	Kincardine	Bruce, Ont.
Wilkinson, H. S.	Toronto	York, Ont.
Willmott, H. B	Walbridge	Hastings, Ont.
Wilson, J	Whitechurch	Bruce, Ont.
Wilson, H. M	Toronto	York, Ont.
Wilson, R	Fordwich	Huron, Ont.

Specialists.

Bainard, E.	St. Thomas	Elgin, Ont.
Baird, D.	St. Marys	Perth, Ont.
Bell, H. J.	Oxley	Essex, Ont.
Blyth, C. W.	Felstead	Essex, England.
Buchanan, R. T.	Montreal	Quebec.
Cartwright, E. A.	Toronto	York, Ont.
Cartwright, S. H.	Toronto	York, Ont.
Dodd, G. L. A.	Ashford	Kent, England.
Gibson, T. F. E.	Toronto	York, Ont.
Goldsmith, E. T.	Belleville	Hastings, Ont.
Harris, Jas	Carmarthen	South Wales.
Henry, G. S.	Toronto	York, Ont.
Jacombe, F. W.	Guelph	Wellington, Ont.
Law, J. G. H.	Braintree	Essex, England.
Layborn, A.	Northfleet	England.
Mitchell, J. W.	Lansdowne	Leeds, Ont.
Sloan, H.	Guelph	Wellington, Ont.
Wilson, A. C.	Greenway	Huron, Ont.
Winchester, G. H	Toronto	York, Ont.

College Roll for 1897.

4. Dairy Students.

Name.	P. O. Address.	County, etc.
Anderson, G. A	Bowden	Alberta, N.W.T.
Andrus, E.	Castleton	Northumberland Ont
Armstrong, W. J.	L'Amaroux	Huron, Ont.
Black, G. W.	Winchester	Dundas, Ont.
Barklie, R. C.	Port Stewart	Ireland, Ont.
Boyes, F.	Evelyn	Middlesex, Ont.
Clare, E. A	Coldstream	Middlesex, Ont.
Cleary, D	Uptergrove	Ontario, Ont.
Cochran, J. A.	Bishop's Mills	Grenville, Ont.
Corrigan, J. A.	Mt. Forest	Wellington, Ont.
Counsell, W. N.	Hamilton	Wentworth, Ont.
Crowe, W. J.	Burgoyne	Bruce, Ont.
Dangerfield, J. A.	Oxford Mills	Grenville, Ont.
Ferris, T. A	Tilsonburg	Oxford, Ont.
Flack, S.	Lavender	Simcoe, Ont.
Goodwin, G. W	Springford	Oxford, Ont.
Gracey, A. E.	Currie's Crossing	Oxford, Ont.
Graham, W. G.	Burritt's Rapids	Grenville, Ont.
Haines, H.	Arkell	Wellington, Ont.
Hermeston, E. J.	Belmore	Huron, Ont.
Ireland, K	Zenda	Oxford, Ont.
Kennedy, E. E.	Welland	Welland, Ont.
Kennedy, H. E.	Kingsmill	Elgin, Ont.
Lipsit, J. B.	Straffordville	Elgin, Ont.
Mansfield, T. D	Rideau View	Russell, Ont.
Martin, C. C.	Tintern	Lincoln, Ont.
Martin, L	Tintern	Lincoln, Ont.
Menzies, G.	Molesworth	Perth, Ont.
Metcalf, D. C.	Portal	Bruce, Ont.
Mullett, J. L	Castleton	Northumberland, Ont.
Munro, W.	Villa Nova	Norfolk, Ont.
Murphy, W. H.	Kemptville	Grenville, Ont.
McDiarmid. H. J.	Abertoyle	Wellington, Ont.
McDonald, Geo	Bluevale	Huron, Ont.
McFetters, J. A	Munising	Michigan, U. S. A.
McGee, S. E	North Gower	Carleton, Ont.
McLean, C. W.	Spencerville	Grenville, Ont.
McLeod, G. B.	Oliver	Oxford, Ont.
Nunn, J. W	Landsdowne	Leeds, Ont.
O'Neill, W. E.	Picton	Pr. Edward, Ont.
Orchard, A. L	Seagrave	Ontario, Ont.
Patterson, H	Burritt's Rapids	Grenville, Ont.
Patterson, J	Burritt's Rapids	Grenville, Ont.
Pettapiece, Wm. M.	Mctherwell	Perth, Ont.
Porter, T. J	Banda	Dufferin, Ont.
Pyke, H. R.	Shakespeare	Perth, Ont.
Reynolds, H. E	Solina	Durham, Ont.
Scott, D. M	Tavistock	Oxford, Ont.
Servage, W	Berwick	Stormont, Ont.
Shaver, H. L.	Irquois	Dundas, Ont.
Sheppard, J. D.	Lansdowne	Leeds, Ont.
Simpson, L. D.	Guelph	Wellington, Ont.
Smith, F. W.	Guelph	Wellington, Ont.
Sproule, A. E.	Cannington	Ontario, Ont.
Taylor, G. W	Bobcaygeon	Victoria, Ont.
Thackeray, J. C	Harriston	Wellington, Ont.
Thomas, J.	Woodville	Victoria, Ont.
Thomson, F. A.	Woodstock	Oxford, Ont.
Trickey, S. C.	Athens	Leeds, Ont.
Weinert, A	Neustadt	Grey, Ont.
Wilson, J. A.	Dromore	Grey, Ont.
Woodcock, R. H.	Wigan	England.
Wyles, W. J.	Woodstock	Oxford, Ont.

APPENDIX II.

SYLLABUS OF LECTURES.

Lectures began as usual on the 1st October, 1896, and continued, with the omission of the Christmas vacation, until the 30th June, 1897, which latter date was the end of the scholastic year 1896-97.

The following syllabus of lectures will convey some idea of the class-room work done by the several professors in the nine months just mentioned :

FIRST YEAR.

Fall Term—1st October to 21st December.

Agriculture.

Live Stock. Judging beef and dairy cattle with and without score-card. General stable management and care of live stock.

Buildings. Construction of barns, stables, and other outbuildings with reference to economy, convenience, ventilation, etc., the college outbuildings being used to illustrate desirable and undesirable features.

Natural Science.

Chemical Physics. Matter ; accessory and essential properties of matter ; attraction ; various kinds of attraction – cohesion, adhesion, capillary, electrical, and chemical ; specific gravity ; weights and measures ; heat, measurement of heat, thermometers, specific and latent heat ; sources, nature, and laws of light.

Inorganic Chemistry. Scope of subject : elementary and compound substances ; chemical affinity ; symbols ; nomenclature ; combining proportions by weight and by volume ; atomic theory ; atomicity and basicity ; oxygen and hydrogen ; water—its nature, functions, decomposition, and impurities ; nitrogen ; the atmosphere—its composition, uses, and impurities ; ammonia—its sources and uses ; nitric acid and its connection with plants.

Human Physiology and Hygiene. Description of the different tissues of the body ; alimentary system ; circulatory system ; nervous system ; importance of ventilation, and the influence of food on the body ; remarks on the proper care of the body and attention to its surroundings in order to keep it in a continual state of health.

Zoology. Distinction between animate and inanimate objects ; distinction between plants and animals ; basis of classification of animals ; leading character of each sub-kingdom, with special reference to classes of animals connected with agriculture.

Veterinary Science.

Anatomy and Physiology of the horse, ox, sheep, and pig ; osseous system, muscular system, syndesmology, plantar system, and odontology.

ENGLISH.

Composition. Review of grammar, with exercises on capital letters and punctuation.

Literature. Scott's Talisman, and selections from Palgrave's Golden Treasury.

MATHEMATICS.

Arithmetic. Review of subject, with special reference to methods, decimals, interest, discount, general problems.

Bookkeeping. Subject commenced.

Winter Term—14th January to 14th April.

AGRICULTURE.

Live Stock. Judging sheep.

Manures. Composition, management, and application of farmyard manure; crops for green manuring; utility of ashes, lime, salt, gypsum, etc.

Soils. Formation, composition, classification, etc. Principles underlying the various operations of tillage. Movements of water in the soil, importance of soil moisture, conservation of soil moisture, etc.

Land Drainage. Methods of draining. Laying out and construction of drains, etc.

Farm Crops. Characteristics of the principal farm crops, suitable soils, cultivation, etc.

NATURAL SCIENCE.

Inorganic Chemistry (Continued). Carbon; combustion; carbonic acid and its relation to the animal and vegetable kingdom; sulphur and its compounds; manufacture; land uses of sulphuric acid; phosphorus; phosphoric acid and its importance in agriculture; chlorine—its bleaching properties; bromine, iodine; silicon; potassium; calcium; magnesium; iron, etc.

Organic Chemistry. Constitutions of organic compounds; alcohols; aldehydes, acids and their derivatives; formic, acetic, oxalic, tartaric, citric, lactic, malic, uric, and tannic acids. Constitution of oils and fats—saponification; sugars, starch, cellulose, albuminoids, or flesh formers, and their allies; essential oils; alkaloids—morphine and quinine; classification of organic compounds.

Zoology (Continued). Sub-kingdoms further described; detailed account of some injurious parasites, such as "liver-fluke," "tape-worm," "trichina," etc.; insects—their influence on plant life; corals and mollusks as agents in the formation of soil; vertebrates, with special reference to those of importance in the economy of the farm.

Lectures illustrated by specimens and diagrams.

VETERINARY SCIENCE.

Veterinary Anatomy. Anatomy and physiology of the horse, ox, sheep, and pig—digestive system, circulatory system, respiratory system, urinary system, nervous system, sensitive system, generative system, tegumental system.

ENGLISH.

Composition. Exercises continued; letter writing, etc.

English Classics. Critical study of selections from Palgrave continued, with selections from Irving's Sketch Book.

MATHEMATICS AND BOOKKEEPING.

Arithmetic. Equation of payments; percentage; profit and loss; mensuration.

Bookkeeping. Business forms and correspondence; general farm accounts; dairy, field and garden accounts.

Spring Term - 6th April to 20th June.

AGRICULTURE.

Live Stock. Judging Swine.

Rotation of Crops. Necessity of rotation, principles underlying rotation, rotation of crops in relation to maintaining soil fertility, discussion of rotations for different soils and different systems of farming, etc.

Weeds. The most troublesome weeds, their habits of growth, modes of destroying them, etc.

N. B.—*In all judging of live stock during the first year, breed characters are noticed only incidentally, the students being required to judge animals merely as representatives of meat, milk, or wool-producing types.*

NATURAL SCIENCE.

Geology. Connection between geology and agriculture ; classification of rocks—their origin and mode of formation, changes which they have undergone after decomposition ; fossils—their origin and importance ; geological periods and characteristics of each.

Geology of Canada with special reference to the nature and economic value of the rock deposits ; glacial period and its influence on the formation of soil.

Lectures illustrated by numerous specimens and designs.

Botany. Full description of seed, roots, stem, leaves, and flower. Plants brought into the lecture room and analyzed before the class, so as so render students familiar with the different organs and their use in the plant economy.

Lectures illustrated by excellent diagrams.

VETERINARY SCIENCE.

Materia Medica. The preparation, doses, action, and use of about one hundred of the principal medicines used in veterinary practice.

ENGLISH.

English Grammar and Composition. Tarbell's Lessons in Language, Bk. II.

English Classics. Critical study of selections from Palgrave and Irving.

MATHEMATICS.

Mensuration. Mensuration and services—the square, rectangle, triangle, trapezoid, regular polygon, circle. Special application to the measurement of lumber. Mensuration of solids · special application to the measurement of timber, earth, etc.

SECOND YEAR.

Fall Term.—1st October to 22nd December.

AGRICULTURE.

Live Stock. History and characteristics of the leading breeds of sheep ; critical judging of animals as representatives of their respective breeds.

NATURAL SCIENCE.

Agricultural Chemistry. Connection between chemistry and agriculture ; the various compounds which enter into the compositions of the bodies of animals ; the chemical changes which food undergoes during digestion ; chemical changes which occur in the decomposition of the bodies of animals at death ; the functions of animals and plants contrasted ; food of plantsand whence derived ; origin and nature of soils ; classification of soils ; causes of un-

productiveness in soil and how detected; preservation, improvement and renovation of soils; manures classified; the chemical action of manures on different soils; commercial valuation of fertilizers.

Horticulture.

Fruit Growing.

Introduction. Brief history of horticulture; extent and importance of the industry; Ontario as a fruit-growing country; the outlook for the fruit industry; requisites for the business.

Leading Principles in the Growth of Trees. Description and function of roots, stems, branches, buds, leaves, flowers, fruit and seeds. Illustrated by specimens in the class room.

Production of New Varieties. Species and varieties; natural and artificial pollination; crossing and hybridizing practised by students in the greenhouses and orchards.

Propagation of Varieties. By cutting, layers, grafting and budding. Illustrated by specimens and practised by students in the greenhouses.

Setting out Orchards and Fruit Plantations. Suitable soils and situations; distances for planting; marking out the ground; obtaining nursery stock; transplanting; watering; mulching.

General Management of Orchards and Fruit Plantations. Cultivation: manuring; spraying; thinning fruit; implements suitable for the different operations.

Different Kinds of Fruit. Apples, pears, quinces, plums, apricots, cherries, grapes, raspberries, blackberries, currants, gooseberries, strawberries, etc., treated of in detail according to the following syllabus; (1) History and botanical matter; (2) extent of cultivation; (3) methods of propagation; (4) soils suitable; (5) culture required; (6) methods of pruning and training; (7) time and manner of harvesting; (8) packing and marketing; (9) method of keeping and storing; (10) varieties grown.

Veterinary Science.

Pathology. Osseous System. Nature, causes, symptoms, and treatment of diseases of bone, as splint, spavin, ringbone, etc.

Muscular System. Nature, causes and treatment.

Syndesmology. Nature, causes, symptoms, and treatment of curb, bog spavin, and other diseases of the joints.

Plantar System. Nature, causes, symptoms, and treatment of corns, sand-crack, founder, and other diseases of the feet.

Odontology. Diseases of the teeth, and treatment of the same.

English.

English Classics. Critical study of Shakespeare's "Julius Cæsar," and two "Representative Essays."

Physics.

Dynamics. Force (different kinds of); motion; laws of falling bodies; work; the simple machines.

Statics. Composition and resolution of forces; parallelogram of forces; conservation of energy.

Winter Term.—14th January to 4th April.

Agriculture.

Live Stock. History and characteristics of the leading breeds of beef and dairy cattle. Special attention paid to practical work in judging with and without score-card.

Natural Science.

Agricultural Chemistry. Continuation of the subject from preceding term, as follows: Composition of plants in relation to the soils upon which they grow; rotation of crops; the classification of fodders according to their chemical composition, and a general treatment of the science of cattle feeding; relation of feeding to manure; chemistry of the dairy.

Economic Entomology. Anatomy: classification and metamorphosis of insects; principal insects injurious to vegetation; their habits, and the best methods of checking and preventing their ravages; insecticides, and the best methods of applying them; beneficial insects referred to. Course illustrated by a good collection of beneficial and injurious and of insectivorous birds.

Meteorology. Relation of Meteorology to agriculture; composition and movements of the atmosphere; description of the barometer; different kinds of thermometers; pluviameter and anemometer, and how to read them; temperature; its influence on agriculture; the elements which are to be considered in the discussion of climate: the principles considered in forecasting the weather.

Lectures illustrated by instruments referred to.

Horticulture.

1. Vegetable Gardening.

Gardening as an Occupation. Extent and importance of this industry; market gardening near large towns and cities.

The Farmer's Garden. Location, size and soil suitable.

Fertilizers for the Garden. Barnyard manure; composts; artificial fertilizers; time and manner of applying them.

General Management of Garden. Preparation for and cultivation of crops; rotation of crops; plan of garden.

Garden Seeds. Method of obtaining; vitality: time and manner of sowing; conditions favorable to germination.

Raising Plants. Construction and management of hotbeds and cold-frames; transplanting.

Forcing Garden Crops. Illustrated by growth in the greenhouses of radishes, lettuce, onions, potatoes, tomatoes, cauliflowers, cucumbers, melons, rhubarb, mushrooms, etc.

Garden Crops. Beets, carrots, parsnips, salsify, radishes, turnips, potatoes, onions, asparagus, spinach, lettuce, cabbage, celery, rhubarb, cauliflower, peas, beans, corn, melons, squashes, cucumbers, tomatoes, herbs, etc., treated of in detail according to the following syllabus: (1) History and botanical matter; (2) Importance and extent of cultivation; (3) Soils and fertilizers suitable; (4) Propagation; (5) Culture and general management; (6) Harvesting; (7) Packing and marketing; (8) Storing; (9) Varieties grown.

2. Landscape Gardening.

Location of buildings: making and care of lawns; kinds, arrangement, and care of trees, shrubs, vines, hedges, and flower-beds; course and construction of walks and drives; general surroundings.

3. Arboriculture.

Importance of forests: their effect on climate: different kinds of trees—their occurrence, habits, and uses; where trees should be planted; raising trees from seed; planting operations; transplanting large trees; care and management of trees, with a view to ornament, shelter and economy.

4. Floriculture.

Soil for house plants; methods of potting: propagation of plants; effect of atmosphere, temperature, and light on plants; watering; trimming, and training; treatment of frozen plants; resting plants; kind of plants suitable for window or conservatory: hanging baskets, rockeries; flower beds, etc.: arrangement of plants for effect.

Veterinary Science.

Digestive System. Nature, causes, symptoms, and treatment of spasmodic and flatulent colic, inflammation of the bowels, acute indigestion, tympanitis in cattle, inpaction of the rumen, and many other common diseases.

Circulating System. Discription of the diseases of the heart and blood.

Respiratory System. Nature, causes, symptoms, and treatment of catarrh, nasal gleet, roaring, bronchitis, pleurisy, and inflammation of the lungs, etc.

Urinary System. Nature, causes, symptoms, and treatment of inflammation of the kidneys, etc.

Nervous System. Nature, causes, symptoms, and treatment of lock jaw, stringhalt, etc.

Sensitive System. Nature, causes, symptoms, and treatment of the eye and ear.

Generative System. Nature, causes, symptoms, and treatment of abortion, milk fever, etc.

Tegumental System. Nature, causes, symptoms, and treatment of scratches, sallenders, mallenders, parasites, and other diseases of the skin.

English Literature and Political Economy.

English Classics. The critical study of Shakespeare's "Merchant of Venice," and Blackmore's "Lorna Doone."

Political Economy. Utility; production of wealth—land, labor, capital; division of labor; distribution of wealth; wages; trades unions; co-operation; money; credit; credit cycles; functions of government; taxation, etc.

Physics.

Hydrostatics. Transmission of pressure; the hydraulic press; specific gravity; density; pumps, siphons, etc.

Agricultural Physics. The physical peculiarities of different soils; the physical effect of lime, humus, etc., on soils; the action, movements and functions of water in the soil; water capacity of soils; conservation of soil moisture; soil cultivation and drainage.

Spring Term.—6th April to 30th June.

Agriculture.

Live Stock. History and characteristics of the leading breeds of swine. Practical work in judging swine. Lectures on herd-books, pedigrees, principles of breeding, management, and feeding of beef cattle, dairy cattle, sheep and swine.

Natural Science.

Determination of soils and fertilizers by physical properties.

Analytical Chemistry. Chemical manipulation; preparation of common gases and reagents; operations and analysis—solution, filtration, precipitation, evaporation, distillation, sublimation, ignition, and the use of the blow-pipe; testing of substances by reagents; impurities in water; adulteration in foods and artificial manures; injurious substances in soils.

Systematic and Economic Botany. Classification of plants and characters of the most important orders.

This course is illustrated by a large collection of plants in the college herbarium, and also by analysis of several plants collected in the fields and woods of the farm.

Greenhouse Plants. Special study of all plants grown in our greenhouses, and the shrubs, etc., on the lawn.

Veterinary Science.

Materia Medica. The preparation, actions, uses, and doses of medicine—continued from the spring term of the first year. Lectures on special subjects, such as pleuro-pneumonia, the rinderpest, tuberculosis, etc.

Veterinary Obstetrics. Description of fœtal coverings. Pneumonia in connection with puberity, œstrum gestation, sterility, abortion, normal and abnormal parturition. Diseases incidental to pregnant and parturient animals.

ENGLISH.

English Classics. The critical study of Tennyson's "Locksley Hall," and "Representative Essays."

PHYSICS.

Electricity and electrical machinery.

ROAD-MAKING.

Determination of proper slopes; shape of road bed; drainage of roads; various road coverings, etc.

THIRD YEAR.

General Course.—Taken by all Third Year Students.

AGRICULTURE.

(1) Review of first and second year work; (2) Lectures and practical work (Fall Term.)

CHEMISTRY.

(1) Review of second year work in agricultural and animal chemistry.

(2) *General Chemistry.* Lectures, with experiments, two hours per week, till Christmas.

(3) Reading: (Storer), Vol. I., Chapters 1. 2, 3, 4, 7, 8, 10, 11, and 12; Vol. II., Chapters 5, 6, 7, 8, 9, 10, 15, 17, 18, and 19; "Manual of Cattle Feeding" (Armsby).

GEOLOGY.

(1) Lectures: A general review of the subject, referring particularly to the ages, systems, and formations in Canada; special attention to the geology of Ontario, New Brunswick, Nova Scotia, Manitoba, and the Northwest, with regard to their most valuable economic products; the disintegration and decomposition of rocks in the formation of soil, etc.

(2) Reading: "Elements of Geology" (Le Conte), Part I., Chapters 2 and 3; Part II., Chapters 5 and 6; Part III., Chapters 3 and 5.

Rererence: "Handbook of Canadian Geology" (Dawson).

BOTANY.

(1) Structural and physiological botany; cells and tissues of plants; organs of vegetation and reproduction; plants in relation to soil; processes of absorption, circulation, assimilation, metabolism, and transpiration.

(2) Vegetable histology: technique of microscope; mounting, examination, and drawing of vegetable cells and tissues, etc.

(3) Reading: Botany (Bastin).

Reference: "Physiological Botany" (Goodale).

ENGLISH.

Composition. The writings of impromptu compositions and four original essays in connection with the study of models of prose as found in "Representative Essays."

Shakespeare—"Henry IV."; "Othello," and "The Tempest."

Milton—"Paradise Lost," Books I. and II. and "Comus."

Pope—"Eloise to Abelard."

Addison—"Spectator Essays," 213, 215, 224, 279, and 285.

Wordsworth—"Michael," "Intimations of Immortality," "Tintern Abbey," and the "Ode to Study."

Scott—"Kenilworth."

Byron—"Childe Harold," Canto II.

Macaulay—"Byron."

Tennyson—"In Memoriam," "The Holy Grail," "The Lotus Eaters," "Ulysses," and "Crossing the Bar."

Pancoast—"Introduction to English Literature."

Special Courses.—One taken by each Third Year Student.

I.—AGRICULTURE AND DAIRYING.

Agriculture.

General Field Agriculture. Soils, soil physics, methods of cultivation, draining, manures, rotation of crops, adaptation of soils to different plants, seeds and seeding, growing and harvesting of crops, including a scientific and practical knowledge of the grasses and clovers found in Ontario, and all else pertaining to the soils and crops of this Province.

Microscopic study of rust, smut, and other injurious fungi affecting farm crops, with notes on methods of treatment and prevention.

Reading: all works and selections prescribed for first and second years; "Storer's Agriculture," Vols. I. and II.; "The Soil" (King); Reports and Bulletins as directed.

Live Stock.

(1) *Cattle.* The principal breeds of beef and dairy cattle, including Shorthorns, Herefords, Aberdeen-Angus, Galloways, Sussex, Devons, Ayrshires, Jerseys, Guernseys, Holsteins, Crosses, and Grades; general characteristics, with emphasis on the strong and weak points of each; principles and practice of breeding; foods, fodder, feeding, and management.

(2) *Sheep.* The principal breeds of sheep, including Shropshires, Oxford Downs, Southdowns, Hampshire Downs, Suffolks, Cotswolds, Lincolns, Leicesters, Dorset Horns, and Merinos; the general characteristics, with the strong and weak points of each as regards carcass, wool and mutton; breeding; food, feeding, and management of flocks, ewes, and lambs; also an exact and thoroughly practical knowledge of the different kinds of wool.

(3) *Swine.* Principal breeds of swine, including Berkshires, Yorkshires, Tamworths, Poland Chinas, Chester Whites, Duroc Jerseys, Suffolks, and Victorias; general characteristics, with emphasis on strong and weak points of each; breeding; foods, feeding, and management.

(4) *Horses.* Heavy-draught—Clydesdale, Shire, Suffolk Punch, and Percheron; Coach horses—Hackney Cleveland Bay, etc.; roadsters; thoroughbreds; saddle horses; horse breeding; education of horses; soundness; foods, feeding and management

(5) *Poultry.* Principal breeds of poultry; including Wyandottes, Plymouth Rocks, Javas, American Dominiques, Andalusians, Leghorns, Minorcas, Spanish, Brahmas, Cochins, Langshans, Hamburgs, Polish, French, Dorkings, Indian Game, and Black-Red Game; poultry houses; food, feeding, and management of poultry.

(6) Reading: "Stock Breeding" (Miles); Live Stock Hand Books; "Farm Live Stock of Great Britian" (Wallace), Chaps. 3, 4, 5, 6, 7, and 17: "The Business Hen" (Rural Publishing Co., N.Y.); Reports and Bulletins as directed.

Dairying.

(1) Theory and practice in everything pertaining to the setting of milk, handling of milk and cream, milk-testing, butter-making, cheese-making, and the running of cream separators, etc., as required of students in the special Dairy Course; pasteurization of milk; dairy bacteriology; experimental work, and original investigation.

(2) Reading: "American Dairying" (Gurler); "Cheddar Cheese-Making" (Decker); "Milk-Testing" (Shoenman); "Milk, Butter and Cheese" (Oliver); "The Farm and the Dairy" (Sheldon); "Dairy Bacteriology" (Russell).

Entomology.

(1) Review of second year work.

(2) Further study of those species which attack farm and garden crops.

(3) Reading: "Insects and Insecticides" (Weed); portions of "Comstock's Entomology.

Reference: "Insects Injurious to Fruits" (Saunders).

II.—HORTICULTURE, BOTANY AND ENTOMOLOGY.

Horticulture.

Fruit Growing—

(1) General review of second year lectures.

(2) Laboratory work in pollination; propagation of plants; preparation of insecticides and fungicides; management of pumps, nozzles, and other appliances for spraying; laying out of orchards and fruit gardens; classification and description of fruits; making drawings of fruits.

(3) Reading: "American Fruit Culturist" (Thomas); "Amateur Fruit Grower" (Green); "Small Fruit Culturist" (Fuller); "Nursery Book" (Bailey), and "The Apple in North America" (Bailey).

Vegetable Gardening—

(1) General review of second year lectures.

(2) Laboratory work in testing seeds and conditions favorable to germination; transplanting seedlings; forcing vegetable crops; handling and storing vegetables; planning, arrangement and rotation of crops in garden; making hotbeds and cold frames, etc.

(3) Reading: "How to make the Garden Pay" (Greiner); "Vegetable Garden" (Vilmorin), and "Origin of Cultivated Plants" (De Candolle).

Floriculture—

(1) Lectures based on work in laboratory and greenhouses.

(2) Laboratory work in the preparation of soil for plants; propagating plants; study of the effects of atmosphere, temperature, and light on plants; watering; trimming; training; treatment of frozen plants; resting plants; making collections suitable for window, conservatory, hanging baskets, rockeries, and flower beds; arrangement of plants for effect.

(3) Reading: "Home Floriculture" (Vick), and "Practical Floriculture" (Henderson).

Arboriculture—

(1) Lectures on the importance of forests, their effect on climate, etc.; kinds of trees, their occurrence, habits, and uses; raising trees from seed; planting and management of trees with a view to shelter, ornament and economy.

(2) Reading—Practical Forestry (Fuller).

Botany—

(1) General review of first and second year work, with "Spaulding's Introduction to Botany" as a text-book.

(2) Systematic botany and experimental plant physiology; mounting of 100 plants; collection and dentification of seeds of 25 species of weeds.

(3) Microscopic study of injurious fungi which affect orchard, garden, and greenhouse crops and plants.

(4) Reading: "Experimental Plant Physiology," (Oels and Macdougall); "Physiological Botany for Gardeners," (Sorauer); "Fungi and Fungicides," (Weed); bulletins, reports and special literature as directed.

Entomology—

(1) Review of second year work.

(2) Further study of species, especially those which attack orchard, garden and greenhouse crops and plants.

(3) Reading: "Insects and Insecticides," (Weed); "Insects Injurious to Fruit," (Saunders); portions of Comstock's "Entomology."

III.—BIOLOGY.

Botany—

(1) Review of first and second year work, with Spaulding's "Introduction to Botany" as a text-book.

(2) Systematic Botany; mounting of 100 plants; collection and identification of 25 species of weeds.

(3) Experimental Plant Physiology; Laboratory work with "Experimental Plant Physiology," by Oels and Macdougall, as a text-book.

(4) Vegetable Histology; methods: imbedding, section cutting, mounting on tissues, etc., with Thomas's "Vegetable Histology" as a text-book, and references to Lee's "Microtomist's Vade Mecum," Zimmerman's "Micro-Technique," Bower's "Practical Botany," and special literature as directed.

(5) Cryptogamic Botany and Plant Pathology; A laboratory course, supplemented by lectures—microscopic study of the diseases of plants; remedies, etc.; collection and identification of 25 species of injurious fungi.

Reading and reference: "Fungi and Fungicides," (Weed); "British Uredineae and Ustilagineae," (Plowright); "British Fungous Flora," (Massee); "Myxogastres" (Massee); "Biology of Ferns," (Atkinson); special and current literature as directed.

(6) Reading: As prescribed by professor, including portions of "Text-Book of Botany," by Vines; and "Outlines of the Classification of Plants," by Goebel; also current literature.

Books of reference: Spotton, Part II; "Manual of Botany," (Gray); "Practical Botany," (Bowers); "Comparative Anatomy of the Phanerogams and Ferns," (De Barry); "Physiological Botany," (Sachs).

Zoology—

(1) Lectures and laboratory work, including dissection and critical examination of typical specimens of the main divisions of the animal kingdom.

(2) Histology (elementary work): methods; imbedding, cutting, and mounting of specimens, with Huber's "Normal Histology" as a text-book.

(3) Reading: As prescribed by professor, including portions of "Invertebrate Zoology," (McMurrich); "Zoology," (Wright), and "Biology," (Parker).

Reference: "Biology," (Huxley); "Practical Zoology," (Cotton); "Zootomy," (Parker).

Dissecting Instruments, etc., to be provided by students, say, 1 scalpel, 1 pair scissors (fine), 1 pair forceps, and a lens.

IV.—BACTERIOLOGY.

Bacteriology—

(1) The microscope and its technique.

(2) Life history and structure of bacterial cell; form and classification of bacteria; requirements and chemistry of bacteria; staining; preparation of culture media.

(3) Laboratory work with non-pathogenic and pathogenic germs; methods of infection; post morten and microscopical examination.

(4) Reading: "Principles of Bacteriology," (Abbott); "Manual of Bacteriology," (Sternberg); "Dairy Bacteriology," (Russell); "Bacteriology," (Novy).

Histology—

Methods ; imbedding, cutting, mounting, and drawing of specimens ; Klein's Histology.

After completing the above course the student will be required to specialize in some line of bacteriological work, to be chosen in consultation with the Bacteriologist ; and to prepare a thesis on original work done in the line of his specialty.

Special reading and books of reference will be prescribed for each student according to the line of investigation chosen by him.

V.—CHEMISTRY AND PHYSICS.

Chemistry—

(1) Organic Chemistry—elementary course of 48 lectures.

(2) Inorganic Chemistry—a course of 28 lectures.

(3) *Laboratory Work:*

1) Preparation of 82 organic compounds (Orendorf).

2) Full course in qualitative analysis.

(3) Gravimetric and volumetric analysis.

(4) Quantitative analysis of water, soils, manure, fodders, and dairy products, etc.

(4) Reading : As prescribed by the Professor of Chemistry, including introduction to the study of the Carbon Compounds Remsen) ; Elliot & Storer's Qualitative Chemical Analysis ; Principles of Theoretical Chemistry, (Remsen) ; portions of Manual of Qualitative Chemical Analysis, (Fresenius) ; Inorganic Chemistry, Advanced Course, (Remsen) ; Principles and Practice of Agricultural Analysis Wiley).

Text Books : " Agricultural Chemistry," (Warrington) ; " Agriculture," Vols. I and II, Storer) ; " Manual of Cattle Feeding," (Armsby) ; " Compounds of Carbon," (Remsen ; " Inorganic Chemistry," Advanced Course, Remsen) ; " Laboratory Manual " (Orendorf).

Physics—

1 Review of second year work.

(2) Soil physics ; " The Soil," King .

(3) Electricity : Electric current, batteries, induction, theory and construction of dynamo, electric lighting, etc.

Reading : As prescribed by teacher, including portions of " Electricity and Magnetism," (Thompson) ; " Electricity," (Forbes) ; " Experimental Science, Hopkins) ; " Dynamo-Electric Machinery," (Thompson).

APPENDIX III.

EXAMINATION PAPERS.

1 Papers Set at Easter Examinations, 1897.

FIRST YEAR.

Agriculture.

I. Distinguish between capillary movement and percolation of water, and explain how each is affected by the character of the soil.

II. Describe some of the means which may be employed to conserve soil moisture, and explain how they produce this effect.

III. It is stated that in watering transplanted trees or plants, enough water should be added to cause percolation, otherwise the watering may do more harm than good.

(*a*) Explain why this is so.

(*b*) What does it teach regarding the treatment of a field after a shower?

IV. Describe and explain the benefits derived from having a soil well ventilated.

V. Discuss the effects of rolling soil.

VI. What things must be considered in deciding upon the depth and distance apart at which to place underdrains?

Explain clearly the effect of placing drains too far apart.

VII. Discuss the value of peat, lime and ashes as fertilizers.

Poultry.

I. Name the varieties of fowl in the American class, and state whether they are sitters or non-sitters; also give the color of eggs and skin.

II. State the main points of difference between the Langshans and the Brahams.

III. Give a list of the varieties in the Mediterranean class and give briefly the leading characteristics of this class.

IV. Describe the comb and the plumage of the Barred Rocks.

Give the chief disqualifications in the Rock varietes.

V. What is meant by the "hackle," the "primaries," and the "secondaries;" "barring," "pencilling" and the "shaft?"

VI. What should be done to keep hens and hen-houses free from vermin? How would you proceed to get rid of lice in poultry buildings?

VII. Describe what you consider a suitable roost for hens, giving size, height, and method of of construction.

VIII. What would you use for soft food? How would you mix and feed it?

IX. Give periods of incubation of hens, ducks, geese and turkeys.

X. (For class A only.) Describe a fertile and unfertile egg on the sixth and sixteenth days during the period of incubation.

Chemistry.

I. Give one example of each of the following:

(*a*) Chemical change,

(*b*) Physical change,

(*c*) Chemical compound,

(*d*) Mechanical mixture,

(*e*) Combustible substance,

(*f*) Incombustible substance,

(*g*) Combustion in its broadest sense,

(*h*) Oxidation,

(*i*) Reduction.

II. Name all those substances, which, from the experimental study of chemistry, you have observed compose, or are contained in the atmosphere; and give experimental proof of the presence of each substance that you name.

III. (*a*) Calculate the weight of oxygen that may be obtained from 15 grams of potassium chlorate.

K = 39, Cl = 35.5, O = 16.

(*b*) Sketch an apparatus showing the preparation and collection of oxygen.

(*c*) How may it be shown that the gas collected is oxygen?

IV. By the use of illustrations, show that you clearly understand the following important chemical laws: Definite proportions, multiple proportions, and indestructibility of matter.

V. Outline clearly any experiment showing the proportions of hydrogen and oxygen in water, (1) by volume, and (2) by weight.

VI. In what way should ammonium chloride be treated to liberate ammonia? What would be the effect on the nitrogen of farmyard manure of mixing wood ashes with the manure?

VII. Show by chemical equations the chemical changes in each of the following:

(*a*) Common salt + sulphuric acid.

(*b*) Common salt + sulphuric acid in the presence of manganese dioxide.

(*c*) Limestone + hydrochloric acid.

(*d*) Lime-water + carbon dioxide.

VIII. Explain the presence of a blue flame over coal-fires in stoves and open grates.

IX. The specific gravity of pure sulphuric acid being 1.85, calculate the weight of 120 grams of the acid.

X. Give the properties of carbon bisulphide; and show by chemical equations its decomposition by burning.

Geology.

I. State what ingredients are added to the soil by the decomposition of the following rock masses: feldspar, quartz, dolomite, apatite and chlorite. Which one is the most important and why?

II. Name the different kinds of rocks and give a concise account of their character, occurrence and mode of formation.

III. Define,—mountain of circumdenudation, fossil, casts, avalanche, strike, conformab strata, moraine, kitchen-midden, dike and stalactite.

IV. Draw diagrams representing the following: Mountain of eruption, mountain of elevation, trilobite, unconformable strata and water erosion.

V. Describe how the following act as disintegrating agents: oxygen, carbonic acid, rain, ice and earthworms.

VI. In what rock systems in Ontario are the following found : Gas, petroleum, salt, gold, dolomite, copper, iron corals, fish and Eozoon canadense ?

VII. (*a*) Give your reasons for believing that the interior of the earth is at present in a heated condition.

(*b*) Give the names of the writers on Geology whose works you have consulted during the term.

Zoology.

I. Describe fully a cell, and state what are the conditions necessary to life.

II. Compare as to habits of life, and their structure—tapeworms, tunicates, and frogs.

III. Name the different divisions among animals in which parasitism, symbiosis and mimicry are found.

IV. Describe the nature of the skin in the different classes of vertebrates.

V. Compare how nutrition is carried on in corals, clams and the amoeba ; and respiration in fishes, frogs and birds.

VI. Give the life history of a sea-jelly, and state what mode of reproduction it illustrates. Name some other forms of reproduction in the animal kingdom.

VII. Write notes upon the swimming bladder and the quadrate bone in certain classes among the vertebrates.

Veterinary Anatomy.

I Describe the periosteum.

II. Describe the diaphragm.

III. Name the different varieties of permanent cartilage, and the divisions of each variety.

IV. Describe the ligamentum nuchea.

V. Give the functions of (*a*) Saliva, (*b*) Gastric juice, (*c*) bile, (*d*) Pancreatic juice.

VI. Name the cartilages of the larynx, and describe the epiglottis.

VII. Give the number, kinds and arrangement of the teeth you would expect to find in a horse four years old.

VIII. Trace the blood from the left ventricle of the heart to the hind foot.

IX. State the functions of (*a*) The cerebro-spinal nerves, (*b*) The sympathetic system of nerves.

X. Name the different tissues named in the eye lids.

English Literature.

I.

The swallows, oft, beneath my thatch
Shall twitter from her clay built nest :
Oft shall the pilgrim lift the latch,
And share my meal, a welcome guest.

Around my wild porch shall spring
Each fragrant flower that drinks the dew ;
And Lucy, at her wheel, shall sing
In russett gown and apron blue.

(*a*) State the name of the poem from which the above is taken.

(*b*) Name the author.

(*c*) Write a prose paraphrase of these stanzas, sentence by sentence, retaining as nearly as possible the same words.

(*d*) Point out any *special* marks that distinguish these lines from prose.

(*e*) Describe, in your own words, the picture that the author has drawn in these stanzas.

II. Quote Tennyson's, "Crossing the Bar."

State, as plainly as possible, the meaning of the poem, being careful to explain any difficult passages.

III. Sweet stream, that winds through yonder glade,
Apt emblem of a virtuous maid—
Silent and chaste she steals along,
Far from the world's gay busy throng;
With gentle yet prevailing force,
Intent upon her destined course;
Graceful and useful all she does,
Blessing and blest where'er she goes;
Pure bosomed as that watery glass,
And Heaven reflected in her face. (Cowper).

(*a*) What qualities of the "virtuous maid" are mentioned in these lines?

(*b*) Shew how each of these qualities is represented by the stream.

IV. (For Div. "A" only):

The World is too much with us; late and soon,
Getting and spending we lay waste our powers;
Little we see in Nature that is ours;
We have given our hearts away, a sordid boon!
This sea that bares her bosom to the moon,
The winds that will be howling at all hours
And are up-gathered now like sleeping flowers,
For this, for everything, *we are out of tune.* (Wordsworth).

(*a*) Give a brief account of Wordsworth's life in relation to his poetry; in this account state the distinguishing features of his poetry, and illustrate from the above and from other quotations.

(*b*) Interpret the above passage in a few plain words, explaining especially the parts underlined.

V. Describe, after Irving, the scene at the village when Rip Van Winkle returned.

VI. Reproduce, as nearly as possible, Irving's description of the following: Nicholas Vedder, Rip's wife.

Grammar and Composition.

I. Define the following terms: *Mood*, *case*, *gender*, *voice*, *clause*, *sex* and *phrase*.

II. Distinguish between *complete* and *incomplete* verbs. Give sentences illustrating your answer.

III. Point out, name, and give the grammatical connection of all the clauses and phrases in the following sentences:

(*a*) The man in the boat is my friend.

(*b*) "Men flocked to the great house at the corner of Lincoln's Inn fields."

(*c*) "By their coalition was formed a ministry which was in power when George the Third ascended the throne."

(*d*) The motor is driven by means of an electric current.

(*e*) The enraged multitude retreated as the militia advanced.

IV. Make necessary corrections in the following sentences, giving reasons in each case:

(*a*) Can I get excused from church this morning?

(*b*) Will we go by Wyndham or Norfolk street?

(*c*) I seen him just a minute ago.

(*d*) I have often saw as good swimmers as him.

(*e*) If I was him I would not attend lectures.

(*f*) The gardener gave John and I some apples.

V. Parse all the conjunctions and prepositions in this question, and construct a definition of each in accordance with your parsing.

VI. Punctuate the following sentences, giving reasons :

(*a*) "The greatest Roman orator Cicero was patriotic."

(*b*) "The rich and the poor the weak and the strong the young and the old have one common Father."

(*c*) The verger shouted once more all lights out gentlemen please.

(*d*) John Jones B A 24 Spark Street St Catharines Ont.

(*e*) Hallo ho the whole world's asleep bring out the horses grease the wheels tie on the mail.

VII. Write an essay of about 400 words, on one of the following subjects :

The artesian wells at the College.
The A. O. C. concert.
An ideal "At Home."
Hockey.
Sir Oliver Mowat.

VIII. For pupils in division "A" only.

Give the voice, mood, tense, number and person of all the verbs in the following :

"If it can be shown that James did sincerely wish to establish perfect freedom of conscience, we shall think his conduct deserving not only of indulgence but of praise."

Arithmetic.

I. A farmer wishes to make a mixture of oats and peas that will weigh 44 lbs. per measured bushel. He has 64 bushels of oats. How many bushels of peas will he require ?

What would the peas cost him at 60 cents per bushel ? Oats 34 lbs. per bushel. Peas 60 lbs. per bushel.

II. An agent in Toronto sells a quantity of wheat for a merchant in London for $7,240 He pays $100 for freight and storage, and charges a commission of 2 per cent. What sum will he remit to his employer in London ?

III. The rate of taxation in Halifax is 13 mills on the dollar. Find what tax I should have to pay on a property assessed at $3,750.

IV. How many bushels of barley can be put in a bin of the following dimensions : Length, 20 ft. ; breadth, 12 ft. ; depth, 10 ft.

Note.—One cubic foot of barley weighs 37.6 lbs. ; one bushel of barley weighs 48 lbs.

V. Jones invests $5,650 and Smith $6,400 in a joint business ; they make a gain of $1,200 in six months.

(*a*) How should this gain be divided ?

(*b*) What is the rate per cent. of the gain ?

VI. $1,000.00. Guelph, March, 1, 1897.

Seventy days after date, I promise to pay James Lewis or order, One Thousand ($1,000) Dollars, value received.

James McLeod.

This note was discounted at the Traders' Bank on the day it was made at 6%. Find net proceeds.

VII. Find the difference between the *simple* and *compound* interest on $350 for 6 years at 5%.

VIII. Find what sum $200 will amount to in 20 years at 4% compound interest, compounded yearly. $(1.04)^5 = 1.21665$.

IX. For *insurance* and *investment* a man pays $206.40 yearly for 20 years for an endowment policy of $5,000. At the end of the 20 years he withdraws the $5.000. Find what his insurance cost him for the twenty years, money being worth 4% compounded yearly. $(1.04)^5 = 1.21665$.

X. For "A" only.

A man buying a threshing machine, is offered the following options :

(*a*) Spot cash $300.

(*b*) Five equal annual payments (without interest) of $71.00. First payment made now.

(*c*) Promissory note for $335 due in two years. Find which is the best offer, and by how much, money being worth 5% compounded annually.

Book-Keeping.

I. Define and write an example of each of the following : *receipt*, *draft*, *check*, *order*.

II. (*a*) State the object and briefly describe the process of closing the ledger.

(*b*) Into to what account would the following close : Merchandise, Expense, Loss and Gain, Bills Payable, J. Page, Interest and Discount, Stock ?

III. Give four forms of endorsement that might be used in endorsing a note made payable to "A. B., or order." Write short notes explaining the differences in value of the different forms.

IV. What are the different senses in which the expression "Discounting a Note" may be taken ?

V. Give Day Book entries for the following :

(*a*) Cash.	Dr.	$100.00.	
To Bank			$100.00.
(*b*) Merchandise.	Dr.	$1,000.00.	
To Bills Payable			$600.00.
To Cash			$400.00.
(*c*) Cash.	Dr.	$95.00.	
Interest & Dis.		5.00.	
To Bills Receivable			$100.00.

VI. Journalize the following :

Oct. 1—Sold John Smith, on account, 30 bu. seed wheat at 90c. per bu.

Oct. 2—Paid for repairs on implement shed, cash $15.00.

Oct. 3—Received from John Smith, on account, an order on James Baker for $27.00.

Oct. 4—Accepted Wm. Gray's draft on me at 20 days' sight, favor of Geo. Campbell, for $100.00.

Oct. 5—Geo. McKay returned my draft on Jas. McKenzie on its being dishonored. I immediately remit cash $200.00.

VII. For Class "A" only.

(*a*) State fully the circumstances under which a note or other bill becomes outlawed.

(*b*) Journalize the following :

Bought goods for $105.00 at a sale. Gave my note at 10 days in payment. Before removing the goods I sell them for $120.00, getting in payment my own note and a sight draft on A. Kennedy for $15.00.

Drawing.

Note.—*Nine* questions constitute a full paper for both divisions.

I. Construct a square with a given diagonal three inches long.

II. Construct an oblong whose sides will be three inches and four inches long respectively. What is the length of the diagonal ? Prove it.

III. Draw an oval the greatest width of which will be three inches.

IV. (*a*) Construct a triangle, its sides being one and a half, two, and three and a half inches respectively.

(*b*) On each side construct a square.

V. Prove by a diagram that thirty and one-quarter square yards equal one square rod, being granted that five and a half linear yards equal one linear rod.

VI. Make a line three inches long, one of the longer sides of an oblong whose sides will be as 4 to 7.

VII. Show by a diagram the relative positions of the sun, moon, and earth during an annular eclipse of the sun.

VIII. *Define* the following, illustrating your definition of each by a drawing :—

Chord, Diagonal, Quadrant, Diameter, Rectangle.

IX. Construct an equilateral triangle the altitude of which will be two and a half inches.

Divide one side so that its two parts will bear the same ratio as the sides bear to the altitude.

X. For "A" only.

A farmer has a field 100 feet x 500 feet and exchanges it for a square one of the same area. Show by a drawing the length of one side of the square field.

Scale 100 feet to the inch.

For "B" only.

Construct a right angle and bisect it.

(Use of square not permitted in this question.)

SECOND YEAR.

Agriculture.

I. Give a short history of Aberdeen-Angus cattle, mentioning a few of their earlier improvers, and some of the noted tribe of the breed.

II. Explain how the Aberdeen-Angus differs from the Shorthorn and from the Galloway.

III. Write notes on the characteristics and utility of Devon cattle, and state how they differ from Sussex cattle.

IV. Describe a typical Hereford cow.

V. Describe a typical Cotswold sheep.

VI. Discuss the merits of in-and-in breeding, line breeding, "Natural" breeding, and cross breeding.

VII. Comment on the importance of the following:

(*a*) Heredity.

(*b*) Prepotency.

(*c*) Variation.

(*d*) Influence of previous impregnation.

(*e*) Intra-uterine influence.

VIII. (*a*) Discuss the importance of pedigree.

(*b*) What constitutes a good pedigree?

Poultry.

I. Describe the comb and the color of plumage of the Silver and Golden Laced Wyandottes, Barred Rocks, and Andalusians.

II. Name the varieties of fowl in the Asiatic class. Describe the comb and color of plumage of the Light Brahmas and Langshans.

III. What is meant by the following technical terms: "cushion," "crop," "fluff," "sickles," "barring," "tail-coverts," "cockerel," "pullet"?

IV. Before building a poultry house, what is the first thing to be considered? What size would you build to accommodate fifty hens? How would you ventilate the building?

V. Give symptoms of "roup" and "distemper," and the treatment for each.

VI. State what feed you would consider the best for egg production during the winter months.

VII. Name the varieties of fowl in the French class and describe the color of plumage of each variety.

VIII. State the main points of difference between the White Wyandottes, the White Rocks, and the White Javas.

Agricultural Chemistry.

I. Name the groups of ingredients (1) of animals, (2) of feeding stuffs.

II. State briefly the use the animal maks of each of the groups of substances composing feeding stuffs.

III. Calculate the weight of butcher's carcass in a fat sheep, the fasted live weight of which is 225 pounds.

IV. State concisely the function, in animal nutrition, of each of the following digestive agents: Ptyalin, pepsin and trypsin.

V. "The pancreatic juice has a powerful hydrolysing action on starch, maltose being produced. In the intestines the maltose is converted into dextrose. Cane sugar is converted into dextrose and lævulose, and milk sugar into dextrose and galactose, or into lactic acid, before absorption takes place."

Show that you understand fully the chemical nature of every change here spoken of.

VI. Cotton cake (undecort), pasture grass, wheat straw, peas, oats, beans, barley straw, clover hay, turnips, and mangels.

Classify the above fodders into the following groups:

(*a*) Having approximately 22 per cent. nitrogenous substances.
(*b*) " " 11 " "
(*c*) " " 4 " "
(*d*) " " 1 " "

VII. Define feeding standards.

VIII. From the following feeds and data, construct a ration for dairy cows to correspond with the standard. The figures under carbohydrates and fat represent the non-albuminoids reduced to starch:

	Dry matter.	Per cent. digestible			Albuminoid ratio.
		Protein.	Carbohydrates and fat.	Total.	
Corn ensilage	27.9	1.1	18 2	19.3	1 : 16.5
Clover hay	84.7	6.4	38.5	44.9	1 : 6
Oats	89.0	9.2	53.2	62.4	1 : 5.8
Corn meal	85.0	5.5	71.1	76.6	1 : 12.9
Cotton-seed meal	91.8	37.2	43.7	80.9	1 : 1.2
Standard	12.0	1.3	7.5	8.8	1 : 6

IX. From the following data compare the cost of one pound of digestible matter in timothy with that of one pound in clover hay:

	Dry matter.	Per cent. digestible.		
		Protein.	Carbohydrates and fat.	Total.
Timothy hay	86.8	2.9	46.9	49.8
Clover hay	84.7	6.4	38.5	44.9

Timothy hay—$12 per ton. Clover hay—$8 per ton.

Figures under carbohydrates and fat represent the non-albuminiods reduced to starch equivalent.

X. Show that the urea produced equals about one-third the dry protein oxidized in the body. C=12, N=14, O=16, H=1.

Vegetable Histology.

I. Pits.—What are they? Classify, draw, and mention in what orders they are found.

II. Give micro-chemical reactions for,—

1. Oil drops.
2. Crystals of calcium carbonate.
3. Cuticularized tissues.
4. Cellulose.

III. What are Plastids? How do they multiply? How many types of mature forms can be recognised? Describe their shape, colour, size and functions.

IV. Draw and describe the Histology of the anthers of Lilium Canadense, naming all parts in your drawing.

V. Write an essay on starch, taking the following heads for your discourse: Composition, Structure, Occurrence, Formation, Function, Isomerides.

Horticulture.

I. Describe the "Renewal System" of pruning grape vines. To what section of the country is it particularly adapted? Why?

II. Compare the blackberry with the black raspberry in the following particulars: 1. Habit of growth. 2. Method of propagation. 3. Nature of fruit, and 4, Season of ripening.

III. (a) Give in detail the best method of propagating the currant and gooseberry.

(b) Mention a few of the varieties of each you would select in making a collection for home use.

IV. Outline briefly the management of a strawberry plantation under the following headings: 1. Planting. 2. Fertilization of blossoms. 3. Cultivation. 4. Mulching. 5. Cropping.

V. Of what use is a hotbed? Tell briefly how you would make and manage one.

VI. Mention two garden plants grown for their leaf-stalks, and give directions for their culture.

VII. State your views on the selection, care, and preparation of potatoes for planting.

VIII. Write a short, pointed article on the general management of a farm garden.

Veterinary Pathology.

(1) State the manner in which nutrition takes place.

(2) What is inflammation? Name and define is different terminations or results.

(3) Give the general treatment for lameness.

(4) Define a lacerated wound and give treatment.

(5) Give symptoms and treatment for choking in the ox.

(6) What is lymphangitis? Under what conditions does it usually occur? how can its occurrence be prevented? and what is the usual result if repeated attacks?

(7) Give treatment for wringworm.

(8) Give symptoms and treatment for acute indigestion in the horse.

(9) What is azoturia? Give symptoms and treatment.

(10) Give treatment for strangles in the horse.

Literature.—Merchant of Venice and Lorna Doone.

I. (*a*) Mislike me not for my complexion,
The shadowed livery of the burning sun,
To whom I am a neighbor and near bred.
Bring me the fairest creature northward born,
Where *Phœbus' fire scarce thaws the icicles,*
And let us *make incision for your love,*
To prove whose blood is reddest, his or mine.
I tell thee, lady, *this aspect of mine*
Hath feared the valiant; by my love I swear,
The *best regarded virgins* of our clime
Have loved it too. I would not change this hue,
Except to steal your thoughts, my gentle queen.

(*b*) *For thy life let justice be accused.*

(*c*) There's not the smallest orb that thou beholdest
but *in his motion like an angel sings.*

(*d*) The crow doth sing as sweetly as the lark
When neither is attended.

(*e*) I will not choose why many men desire,
Because I will not *jump with common spirits.*

(*f*) . . . All things that are,
Are *with more spirit chased than enjoyed.*

(*g*) Though I am *daughter to his blood,*
I am not to his manners.

(1) By whom and under what circumstances were these each spoken ?

(2) Explain the parts underlined.

(3) From this passage (*a*) what can you infer as to the character of the speaker ?

II. What use does the author make of :—The Ring Incident, Jessica and Lorenzo, Launcelot Gobbo ?

III. State and discuss Portia's method of freeing Antonio.

IV. Discuss Portia's character, quoting or referring to passages to prove your points, under the headings :—(*a*) Womanliness, (*b*) Intelligence, (*c*) Humor.

V. How does Shakespeare satisfy poetic justice in the three "Casket" scenes ? Does Bassanio receive a hint ? Prove your point by quotation or reference.

VI. Discuss Shylock's hatred for Antonio, and the justness of the sentence of the court.

VII. Where, in this play, do you find Shakespeare's views in regard to the relation a wife should hold to her husband, and what are those views ?

VIII. Describe John Ridd's visit to Lord Chief Justice Jeffreys.

IX. What are the chief merits of "Lorna Doone," 1st, in regard to matter ; 2nd, in regard to style ?

Political Economy.

I. Discuss the question of the relation of population to the production of wealth.

II. Explain the origin of rent of land, and show how circumstances may modify Ricardo's "Law of Rent."

III. Explain the phrase "immobility of labor" and "standard of comfort," and show how the facts they point to affect the wages question.

IV. It is frequently stated that periods of business depression are caused by overproduction. Criticise this statement.

V. (*a*) What are the principal functions and desirable qualities of money ?

(*b*) What commodity serves as the basis of our currency, and to what degree does it conform to the requirements you have just stated ?

VI. Explain how the man on a mortgaged farm, and the person holding the mortgage, would be respectively affected by a rise in the value of the basis of currency.

VII. What would you consider to be the chief causes and effects of commercial panics ?

Physics.

I. Two glass tubes of small bore stand vertically, partly immersed, one in water, the other in mercury. Represent by a careful drawing the appearance of the liquids within and surrounding the tubes.

II. What is meant by an "artesian well" ? Explain its peculiarities.

III. Describe the method of construction and graduation of a Centigrade thermometer. Reduce 40° C. to F. ; 120° F. to C.

IV. Explain the following phenomena :

(*a*) Water placed in a cellar on a cold night may prevent the vegetables from freezing.

(*b*) When heat is added to boiling water it does not raise the temperature.

(*c*) Salt mixed with snow makes it melt more rapidly.

(*d*) Heat-rays from the sun pass through the air without warming it.

V. Define and illustrate the different modes whereby heat is transferred.

VI. What is meant by the "mechanical equivalent of heat"? Describe Joule's experiment, and state the results obtained.

VII. "The drain removes only the surplus soil-water." Explain.

VIII. Discuss and explain, under following heads, the physical action of the plant in procuring its supplies of food:—Absorption, Selection, Transpiration.

IX. What are the good and bad physical properties of a sandy soil? State how you would correct its deficiencies.

X. Write an article on the "Use and misuse of the roller."

GERMAN.

1. Ein Geizhals ist ein Mensch, welcher das Gold und das Silber mehr liebt als alles Andere in der Welt. Er kauft absolut kein Brod, kein Holz, keine Kohlen, und keine Kleider, wen er nicht muss. Er hungert und friert. Sein Prinzip ist nehmen und nichts geben. Ich erzahle *Ihen* eine Anekdote von *einem* Geizhals. Horen Sie:

Ein Geizhals war sehr krank. Seine Ende war nahe. Da rief er *seine* drei Sohne zu sich. Der *jungste* Sohn, Richard, war liberal, un der Vater liebte *ihn* nicht. Als die Sohne vor *dem* Fett standen, sagte der Geizhals zu dem *altesten* Sohn: "Johann, ich hinterlasse *dir* $25,000." Johann antwortete: "O mein Vater, ich wunsche, du konteste *langer* leben, und es selbst geniesen." Dan sprach der Geizhals zue dem zweiten Sohn und sagte: "Jakob, ich hinterlasse dir $15,000." Jakob antwortete: "O mein Vater, ich wonsche, du konntest langer leben und es selbst geniesen." Dann sagste der Geizhals zu dem yongsten Sohn: "Richard, du *warst* immer ein *underdankbarer* Hund; ich gebe dir vier Schillinge. Dafur kaufe einen Strick und erhange dich;" Und Richard antwortete: "O mein Vater ich wonsche, du konntest langer leben und es selbst geniesen."

(*a*) Translate into good idiomatic English.

(*b*) Give the principal parts of the following verbs, and classify them as strong or weak: kauft, nehmen, liebte, standen, sagte, sprach, leben, gebe.

(*c*) State the inflection (case, tense, etc.,) of the words underlined.

II. Translate into German:

(*a*) Ninety-six, one thousand eight hundred and fifty-three.

(*b*) Three men, these boys, a small book, two blue eyes.

(*c*) Who bought this hat? I bought it myself in the city, and paid (bezahlte fou dollars for it.

The children were playing before the house.

I like to learn German.

I have something good to give you.

III. Distinguish, using illustrations, between *umlaut* and

Vocabulary for 1.

Holz=wood.

friert=freezes.

rief=called.

geniesen=enjoy.

Strick=halter.

II. Papers Set at Midsummer Examinations, 1897.

FIRST YEAR.

Agriculture.

I. (*a*) Describe the characteristics of leguminous crops, and discuss their agricultural importance.

(*b*) Explain how oats, barley and turnips differ from one another with regard to their ability to procure plant food from the soil.

(*a*) State the principal things to be observed in securing a successful growth of clover and grass.

(*b*) Give what you think would be a good seed mixture for each of the following: (1) A permanent pasture on somewhat low land with clay sub-soil. (2) A meadow for a short course rotation on a clay loam. (3) A lawn.

III. Write notes on Alfalfa, red clover, alsike clover, orchard grass and timothy under the following heads:

(*a*) Suitable soils.

(*b*) Time of sowing.

(*c*) Quantity of seed per acre.

(*d*) Method of seeding.

(*e*) Time to cut for hay.

IV. Give brief directions for harvesting a hay crop.

V. Write notes on the methods of growing and the utility of millet, rape and corn.

VI. (*a*) Explain the advantages to be derived from following a systematic rotation.

(*b*) Discuss the merits of the rotation practised on the College farm.

VII. (*a*) Describe the methods of cultivation suitable for destroying the following classes of weeds: (1) Long-lived annuals, (2) short-lived annuals, (3) simple perennials, (4) creeping perennials.

(*b*) Name as many weeds as you can belonging to each of the classes given above.

Dairying.

I. A farmer has a ton of wheat, a ton of cheese and a ton of butter for sale. How much will he receive for each of these articles at present prices? If they are exported, what amount will be charged for freight for each dollar's worth of these goods? What bearing has this question on the *profits* of farming?

II. Give the indications in a dairy cow of (*a*) nerve force, (*b*) vitality, (*c*) ability to secrete milk. What is the value of (*a*) and (*b*) in selecting cows?

III. What is the best breed of cows for dairy purposes?

IV. Describe the udder of a dairy cow. Explain the metamorphic and transudation theories of milk secretion.

V. Given clover hay, corn silage, mangels, bran and oil-cake, make up a ration for a cow in full flow of milk.

VI. Discuss the food cost of milk, butter and cheese.

VII. Name the chief by-products of the dairy. What is their value to a farmer? How can he get the most out of them?

Poultry.

I. Name the varieties of poultry in the Game class, and describe the variety which you consider the most profitable for market purposes.

II. Name the varieties and give the color of plumage of (1) five varieties of turkeys, (2) four varieties of ducks.

III. (*a*) Name the varieties of fowl in the Hamburg class.
(*b*) Give the good and bad qualities of this class from the farmer's standpoint.

IV. Give the causes, symptoms and treatment for "roup," "chicken-pox" and "bumble-foot."

V. Define the following terms: symmetry, crest, corunculated, fluff, pea comb, spangling, wattles and sickles.

VI. Name the varieties of fowl in the French class; also give color of plumage.

VII. Name the varieties of fowl in the English class, and give briefly the leading characteristics of this class.

VIII. (For Class A only.) Write a short article on preparing fowls for exhibitions.

Bee-Keeping.

I. Explain the relation of bees to plant life.

II. What are the duties of a worker bee?

III. How long does the drone, queen and worker bee take to develop from the time the egg is deposited until the perfect insect emerges?

IV. How many kinds of eggs does the queen bee deposit? Explain the difference.

V. What is swarming?

VI. Explain the construction and use of the honey extractor.

VII. Give desirable points in a properly constructed hive.

Botany.

I. What are biennial plants? Name some.

II. Name the organs of reproduction and describe their functions.

III. Give the characters of the orders, Leguminosæ, Rosaceæ, and Labiatæ, and give a list of plants in each.

IV. Give the formula and diagram of the Iris (Blue Flag).

V. Explain the terms, radicle, ligulate, stoma, silique, raceme, tuber, and rhizome.

VI. Distinguish between a fruit and a vegetable, and give a classification of dry fruits.

VII. "In the act of making vegetable matter, plants purify the air for animals"? Explain this fully.

VIII. A certain plant is polysepalous, polyandrous, apocarpous, with many stamens and yellow petals: name it and the order to which it belongs.

IX. Describe the modes by which fertilization of flowers is effected..

Materia Medica.

I. Mention the different ways in which medicines establish their actions.

II. Name and explain the different conditions that modify the actions of medicines.

III. Define and give an example of:
(*a*) Disinfectant.
(*b*) Ecbolics.
(*c*) Diaphoretics.
(*d*) Refrigerants.
(*e*) Narcotics.

IV. Give the properties and actions of aloes, and state when it is contra indicated.

V. Give the actions, uses and doses of cantharides.

VI. Give the actions and uses of chloral hydrate.

VII. How is biniodide of mercury prepared? Give its actions and uses.

VIII. What are the indications for the use of Nux Vomica?

IX. What is opium? Give its actions and state when it is contraindicated.

X. Give the actions, uses, and doses of oil of turpentine.

English Literature.

I. Quote Wordsworth's poem, "To the Skylark."

(*a*) Write briefly the meaning of each stanza.

II. Contrast the poet's mode of examining an object, such as a bird or a flower, with that of the scientist.

III.

Two Voices are there, one is of the Sea,
One of the Mountains, each a mighty voice;
In both from age to age thou didst rejoice,
They were thy chosen music, Liberty!
There came a tyrant, and with holy glee
Thou fought'st against him—but hast vainly striven;
Thou from thine Alpine holds at length are driven
Where not a torrent murmurs heard by thee.
Of one deep bliss thine ear hath been bereft;
Then cleave, O cleave to that which still is left
For, high-soul'd Maid, what sorrow would it be
That Mountain floods should thunder as before,
And Ocean bellow from his rocky shore,
And neither awful Voice be heard by thee!

(*a*) State the title and the name of the author of this poem.

(*b*) Make a critical analysis of this poem, both in form and meaning, so as to set forth the distinctive qualities of the sonnet.

IV. Name the poem from which each of the following passages is taken, and the author of each:

(*a*) Flowers laugh before thee on their beds,
And fragrance in their footing treads.

(*b*) This neither is it courage nor its choice,
But its necessity in being old.

(*c*) The short and simple annals of the poor.

(*d*) They also serve who only stand and wait.

(*e*) I see her in the dewy flowers,
I see her sweet and fair.

(*f*) The snow shall be their winding sheet.

(*g*) Wide waves the eagle plume
Blended with heather.

(*h*) Blest Isle, with matchless beauty crowned
And manly hearts to guard the fair.

V. State clearly the relation and the contrast between the two poems, L'Allegro and Il Penseroso.

In what different ways is the contrast in feeling and sentiment brought out?

VI. By what signs would you be enabled to recognize characteristic quotations from Irving?

VII. The country was yet naked and.....; but English.....is always verdant, and the sudden change in the temperture of the weather was surprising in its.....effect upon the landscape. It was inspiring and.....to witness this first.....of spring; to feel its warm breath.....over the senses; to see the moist mellow earth beginning to put forth the.....sprout and the..... .. .. blade; and the trees and shrubs in their..... tints and

.....buds, giving the promise of returning foliage and ..... The .....snowdrops, that little borderer on the..... of winter, was to be seen. The.....of the new-dropt lambs was..... .....heard from the fields. The sparrow.....about the thatched eaves and..... ..hedges; and the lark,.....up from the reeking..... .....of the meadows,..... .....away into the bright..... .....clouds, pouring forth..... ...of melody

Insert in each blank space a suitable word, chosen in imitation of Irving's style.

Grammar.

I. Define the following terms as applied to verbs. Person, Number, Tense, Mood, Voice, Conjugation, Indicative, Subjunctive and Imperative.

II. Give the *general rule* for the formation of the plural in English. Mention six other modes of forming the plural, illustrating each by an example.

III. Explain the term *auxiliary*.

Give as full a list as you can of the auxiliary verbs used in English. Underline those of your list which may also be used as principal verbs.

Write two sentences, the first containing a verb used as an auxiliary, the second containing the same verb used as a principal verb.

IV. Pronouns are said to "*agree with their antecedents*." Explain fully this statement, giving examples.

Name the classes of pronouns, and use one pronoun for each class in a sentence.

V. Parse the *underlined* words in the following sentences.

It is good *to* eat.

For him, *to hear* is *to obey*.

She *wrings* the clothes *dry*.

The *load* is *very heavy*.

VI. Explain the term *synonym*.

Construct sentences making use of the following verbs, discriminating them correctly: Believe, calculate, estimate, expect, anticipate, guess, imagine, conceive, judge, consider, suppose, assume.

VII. State clearly the difference in meaning between

(*a*) *Will you leave me*, and *Shall you leave me*.

(*b*) *Will he go*, and *Shall he go*.

(*c*) *You will leave me*, and *You shall leave me*.

VIII. Write a telegram ordering a stateroom on a certain steamer for a certain date.

IX. Distinguish between *compound* and *complex* sentences.

Classify and analyze the following;

(*a*) This is something that I must guard against.

(*b*) He is precisely what he seems.

(*c*) She is doing well except that she cannot sleep.

(*d*) They spoke but we listened.

(*e*) If you are honest, you will be respected.

X. Correct the following, giving reasons:

(*a*) I felt that I must go, and I really think it would have been right.

(*b*) This blunder is actually said to have been made.

(*c*) An insect almost looks as though its body was cut into three parts.

(*d*) Death does not spare the rich, and as little does death spare the poor.

(*e*) Being overcome by his feelings, he sat silent.

(*f*) I am not as large you, you are not as small as I, and not half as spry.

(*g*) The captain expected to reach the harbour before night overtook him.

Arithmetic.

I. Find the cost of the material for fencing a square field containing 10 acres with a barded wire fence. If the wire costs 3 cents a yard, and there are five wires in the fence, and if the posts cost 8 cents a piece, and are placed 8 feet apart.

II. A circular lake is 7 miles in diameter and has a driveway around it. A man wishing to reach a point directly across the lake from where he stands, can drive at the rate of ten miles per hour or row at the rate of six miles per hour. Which is the speedier way? and by how much?

III. Find how many yards of canvas will be required to make a conical tent, having a base of 7 ft. radius, and a slant side of 15 ft., the canvas being 32 inches wide and 10 per cent. being wasted in cutting, overlapping at the seams, etc.

IV. Find the cost at $2.10 per cubic yard of a stone foundation for a barn 42 ft. x 26. (outside measurement), wall 9 ft. high and 2 ft. thick. (Make no allowance for doors or windows.)

V. A stone cutter dressed the tops, fronts, and ends of three stone steps, each 5 ft. x 1 ft. x 6 in., and a fourth step 5 ft. x 3 ft. x 6 in. How much did the work cost at 18c. per square foot dressed?

VI. Find the solid contents in cubic inches of a rubber ball, 6 inches in diameter, which has a hollow in it 3 inches in diameter.

If thrown into a pail of water, would this ball sink or float, the rubber being 1.14 times heavier than water.

VII. A barn is 120 feet long, by 80 feet wide. If the water from the roof is drained into a cylindrical cistern 14 ft. in diameter, find to what depth one inch of rainfall will fill the cistern.

Note.—Candidates for honors must solve one or more of the following questions.

VIII. The diameter of the bottom of a pail is 7 inches, the diameter of the top is 14 inches, the depth is one foot. How many times can it be filled from a hemispherical cistern of 7 ft. radius?

IX. Six men bought a grinding stone 65 inches in diameter, each paying one-sixth of the cost. They agree to grind down their respective shares in succession. If the axle renders a space in the centre, 5 inches in diameter, useless, find the diameter of the grinding stone when the second man had finished grinding his share.

For "A" only.

X. The dimensions of the College Reservoir, now under construction, are as follows:

The top is a rectangle measuring 80 ft. x 60 ft.

The bottom is a rectangle measuring 53 ft. x 33 ft.

Depth, 9 ft.

Find how long (to the nearest minute) this reservoir will supply the fire-pump in case of fire. The capacity of the fire-pump is 500 gals. per minute. 1 cu. ft.—6¼ gals.

SECOND YEAR.

Agriculture.

I. Describe the characteristics of Holstein-Friesian cattle, and discuss their merits as dairy cattle and as "general purpose" cattle.

II. State what things you would especially notice in the selection of a Jersey bull, discriminating between those things which are of importance so far as utility is concerned, and those which are mainly fancy points.

III. Write notes on the history and utility of Ayrshire cattle, and describe a typical cow of the breed.

IV. (*a*) What are the special characteristics of Yorkshire, Tamworth, Berkshire and Chester White swine?

(*b*) Explain how these characteristics may be utilized in producing the most profitable hog for the farmer.

V. (*a*) Describe the feeding and management of a heifer belonging to a dairy breed, from birth until she has produced her first calf.

(*b*) In what essentials do the above differ from the treatment accorded a heifer of a beef breed?

VI. Give directions for the feeding and management of export steers during the fattening period.

VII. Describe the method of rearing a litter of pigs from birth, until they are ready for the butcher.

VIII. Write notes on the feeding and management of a flock of breeding ewes.

Dairying.

I. Outline the main topics discussed in Part II. of "American Dairying." 25

II. Under what conditions will a "cream gathered" creamery be most successful, and under what conditions will a "separator" creamery give best satisfaction? 10.

III. Discuss the "Skimming Station." 10.

IV. What two natural forces are made use in the creaming of milk? Which is the cheaper and which does the most thorough work? 10.

V. If in one minute there is delivered from a cream separator 30 lbs. of skim-milk, and 5 lbs. of cream, how much milk per hour is the separator skimming? 5.

VI. How may the skimming capacity of a cream separator be increased? Which plan have separator men adopted, and why? 10.

VII. Outline a system by which pure milk may be delivered to towns and cities. Give reasons for your answer.

VIII. Mention some essential qualities in export cheese, butter, and bacon.

IX. Write short notes on Condensed Milk, Filled Cheese, Oleo, Lactite, Kephir, Koumiss, and melting points of fat. 10.

Bee-Keeping.

I. When and how would you select a colony of bees to begin bee-keeping?

II. How can excessive swarming be prevented?

III. Give methods of producing extracted honey from the time the hive is ready for the super until the honey has been extracted.

IV. In comb honey production, how can you best secure straight, clean, and well-filled sections?

V. Explain the difference between artificial and natural swarming or increase.

VI. Should swarms be hived on the old or new stand? Give reason for answer

VII. Give the best method of introducing a queen to a strange colony.

Practical Chemistry.

I. What is a group reagent?

II. Why are the sulphides of manganese and zinc not precipitated with those of group II?

III. Give a method for the separation of bismuth, copper and cadnium; and of mercury from silver.

IV. Why should hydrogen sulphide be drawn off before precipitation?

V. Give one test for each of the following: Iron, ammonia, lead and mercury.

VI. Give equations showing the action of sodium hydrate on aluminium chloride, sodium hydrate on maganese chloride, stannous chloride on mercuric chloride, yellow ammonium sulphide on arsenic sulphide.

VII. Does the water draining from soil in cylinder A contain any nitrates, phosphoric acid, potash, or lime?

VIII. Determine one acid and one base in salt given.

Agricultural Chemistry.

I. Classify the proximate and ultimate constituents of a plant.

II. Give one theory for the formation of the (*a*) carbo-hydrates, (*b*) albuminoids.

How and in what form are these constituents conveyed to the different parts of a plant?

III. Write a short note on nitrogen.

IV. To what is the tenacity of a soil due, and how may it be overcome?

V. Compare clayey and sandy soils as to (*a*) natural fertility, (*b*) absorptive and retentive capacity, and (*c*) heat conductive power of their constituents.

How should a soil of a very loose texture—as gravel, for example—be cultivated to insure the best results?

VI Define nitrification. What are the essential conditions for its proper development?

VII. "Soils destitute of lime retain very little potash or ammonia when these are applied as the salts of powerful acids." Explain.

VIII. Why are superphosphates usually quicker in their action than ground phosphates? On what soils may the latter give equally as good results as the former?

IX. Of what facts must a farmer be possessed before he can be truly economical in the use of artificial manures?

X. Discuss the charisteristics of the various farm crops, and show how a knowledge of this is of importance in planning a rotation of crops.

Botany.

I. Fibro-vascular bundles. Refer to their functions and classification.

II. Name the essential elements in plants and explain how the functions of such in the plant's economy are determined.

III. Describe the change in a wheat grain during the process of germination.

IV. Contrast respiration and assimilation in plants.

V. Compare the orders Labiatæ, Borraginaceæ, and Scrophulaniaceæ, and give a list of weeds in each order.

VI. What changes take place in the ovary of Angiospermous plants before and after fertilization?

VII. Give the life history of ergot of rye (Claviceps purpurea), introducing diagrams wherever you can.

VIII. Give the diagram and formula for a grass flower and compare the genera Phleum, Alopecurus, Lolium, and Agropyrum.

Horticulture.

I. Discuss briefly the management of a small fruit plantation under the following headings: 1. Method of arrangement. 2. Cultivation. 3. Pruning. 4. Spraying.

II. Under the following headings, give your views on the planting of an orchard: 1. Time. 2. Arrangement of trees. 3. Method of transplanting. 4. Pruning.

III. Give as fully as possible the main points to be observed in growing melons.

IV. Enumerate some of the prominent features in the general appearance of the College grounds which you think might be adopted in beautifying the surroundings of a country home.

Mention some of the shrubs showing the greatest profusion of bloom at the present time.

V. (1) What influence have forests on the climate and general welfare of a country?

(2) What would you recommend in the way of reforesting in Ontario?

VI. (1) In making a collection of house plants, mention a dozen of the kinds you would select.

(2) Outline briefly a few of the main points to be observed in caring for them.

VII. Identify the specimens before you, giving as far as possible botanical and common names.

Veterinary Osbtetrics.

I. State what you consider should be the general care and management of a pregnant mare.

II. Give the general treatment for mare and foal immediately following a normal birth.

III. Give symptoms and treatment for retention of the placenta in the cow, and state the danger in neglected cases.

IV. Give treatment for complete inversion of the uterus.

V. Give symptoms and treatment for mammitis in the cow.

VI. State how you would proceed to deliver in a case of dystokia caused by malpresentation of the fœtus, and mention the precautions to be observed.

VII. Give symptoms and treatment for retention of the meconium in the foal.

VIII. Give symptoms and treatment for fistula of the teat.

IX. Give treatment for persistence of the urachus.

X. Give treatment for diarrhœa in the young animal.

English Literature.

I. Write the substance of King Arthur's remarks to Geraint after the return of the latter to court.

II. Point out in detail the bearing of the following passage upon the underlying meaning of Tennyson's story, "Geraint and Enid":—

But in the falling afternoon returns
The huge Earl Doorm with plunder to the hall.
His lusty spearmen followed him with noise:
Each hurling down a heap of things that rang
Against the pavement, cast his lance aside,
And doff'd his helm: and then there fluttered in,
Half-bold, half-frighted, with dilated eyes,
A tribe of women, dress'd in many hues,
And mingled with the spearmen; and Earl Doorm
Struck with a knife's haft hard against the board,
And call'd for flesh and wine to feed his spears.
And men brought in whole hogs and quarter beeves,
And all the hall was dim with steam of flesh;
And none spake word, but all sat down at once,
And ate with tumult in the naked hall,
Feeding like horses when you hear them feed;
Till Enid shrank far back into herself,
To shun the wild ways of the lawless tribe.

III. What is each of the following similes used to illustrate?

(1) as this pale taper's earthly spark, (2) like a dog he hunts in dreams, (3) like a shoal of darting fish, (4) like that which kept the heart of Eden green, (5) Like a swarm of fire-flies, (6) as a lion creeping nigher, (7) as sullen as a beast new-caged; (8) star-like mingles with the stars.

IV. All the full-brain, half-brain races, led by Justice, Love and Truth;
All the millions one at length with all the visions of my youth?

All diseases quenched by Science, no man halt, or deaf, or blind;
Stronger ever born of weaker, lustier body, larger mind?

Earth at last a warless world, a single race, a single tongue—
I have seen her far away—for is not Earth as yet so young?

Every tiger madness muzzled, every serpent passion kill'd,
Every grim ravine a garden, every blazing desert till'd,

Robed in universal harvest up to either pole she smiles,
Universal ocean softly washing all her warless Isles.

(*a*) Reproduce the above passage in plain prose.

(*b*) In which poem does this occur? State the thoughts in the other Locksley Hall that are related to these.

V. Write a summation of the sentiments expressed in "You ask me why, tho' ill at ease.'

Suggest a suitable title for the poem.

VI. What is the connection between the theme of the poem "Sir Galahad," and those of the Idylls of the King?

VII. Explain the passages:

(1) Deliver not the tasks of might to weakness.

(2) Not clinging to some ancient saw.

(3) Set in all lights by many minds.

(4) A slow-developed strength awaits
Completion in a painful school.

(5) Principles are rained in blood.

(6) Certain, if knowledge brings the sword,
That knowledge takes the sword away.

VIII. What are the principal qualities of Tennyson's mind and poetic genius, judging from the poems you have studied?

Electricity.

I. Describe the process of amalgamation. State the theory of its effectiveness.

II. Write an article on the process of nickel plating.

III. What is meant by induction?

Describe an experiment in which induced currents are produced.

IV. "When lamps are arranged *in parallel* across a *pair of mains*, a current of *constant potential* and *varying quantity* is required." Explain this statement, being careful to make clear the underlined parts.

Give a mathematical statement of the proposition.

V. By what method of construction is *high potential* or *large current* obtained from a dynamo?

VI. In the motor in the Physical Laboratory, the F. M. coils, in series, are connected (1) In series, (2) In shunt, with the Armature. Which arrangement will give the greater speed to the Armature? Explain.

VII. Draw a diagram of the electrical system in the Physical Laboratory, showing (1) Batteries, (2) Resistance coil, (3) Lamps, (4) Fuses, (5) Posts on lecturing desk. (Make two branches only in the diagram).

State the purpose of the fuses and the resistance box.

VIII. Name the principal parts of the telephone.

Describe and explain one of the principal parts.

Steam Engine.

I. What does a "portable rig," such as used on this farm, consist of?

II. To start a fire under or in a boiler, what is the first step to be taken. Explain procedure until you light the fire.

III. What is the steam gauge for?

IV. Of what use is a safety valve on a boiler?

V. What is inside the cylinder of an engine, and what does it consist of?

VI. What is the slide valve of an engine for?

VII. How would you set this valve?

VIII. How would you reverse an engine?

Carpentering.

I. What should be the form and condition of the teeth of a good working cross-cutting saw?

II. What are the points of difference between the shape of the teeth of the saw for ripping and one for cross-cutting?

III. In purchasing a new saw, state some of the essential points that would indicate the choice of a good one.

IV. How many planes are most commonly used for plain carpenter work, and what are the names in order?

V. What are the best cutting angles for grinding and sharpening plane irons?

VI. What is meant by "trying up" a piece of timber, and "shooting an edge?"

VII. On the framing square, there are three rules or tables; state their uses and give examples of each.

VIII. What numbers should we use on both blade and tongue of the framing square to find the down and level cut of a common rafter for a third pitch roof?

IX. On a right line 14" long lay a square, placing the seven inch mark on the tongue at one end. Move the blade so it will be at the other end; the tongue will then form an angle of 60° with the right line. Mark by the tongue; and using this line as the the given angle, construct a diagram that will produce the several angles required for hopper work.

APPENDIX IV.

CLASS LISTS—EASTER EXAMINATIONS, 1897—FIRST YEAR.

Agriculture.

Division "A."

Class I.

1 Raynor, M.
2 Hume, H. H.
3 Price, W. J.
4 Kennedy, W. J.
5 Marshall, F. R.
5 Murdoch, G. H.
7 Anderson, J. B.
8 Harris, C. H.
8 Tozeland, J. H.
8 Westgate, H. P.
11 Day, E. E.
11 Thomson, G. T.
11 Zavitz, H. V.
14 Wagg, A. J.

Class II.

1 Reid, R. H.
2 Lester, H. A.
2 Snider, C. H.
2 Wilson, E. S.
5 Hawke, A. H.
6 Jarvis, C.
6 Taylor, G. R.
8 Livingstone, J. M.
9 Baird, G.
10 Jarvis, T.
11 Hammell, W. H.
11 McPhadden, A.
11 Morrison, C. A.
11 Schooley, D. B.
15 Tupper, G. B.
16 Deike, H. V.
16 Mallory, F.
16 Ross, D.

Class III.

1 Mathison, E.
2 Scott, N. C.
3 Robertson, D. A.
4 Hollis, J. H.
5 Allison, J. B.
6 Baker, R. G.

Division "B."

Class II.

1 Canning, B.
2 Evoy, E. V.

Class III.

1 Fowler, R. C.
2 Calvert, E.
2 Gethen, G.
4 Hutchinson, L. W.
5 Gardiner, W.
6 Robertson, M.
7 Trueman, J. T.
8 McLaurin, J. D.
9 Blyth, C. W.
10 Forbes, C. W.
10 Hodgson, T. H. H.
12 Golding, H. E.
13 McGregor, T. W.
14 Bunny, B. H.
15 Boyd, H. W.
16 Ball, C. S.
16 Cutler, E. B.

Clark, A.
Law, J. G. H.
Milburn, G. E.
Wickham, W. C.
Fitzgerald, L. P.

Poultry.

Division "A."

Class I.

1 Jarvis, C.
1 Jarvis, T.
4 Hawke.
4 Price.
6 Snider.
7 Kennedy.
8 Hammell.
9 Raynor.
10 Hume.
11 Marshall.
11 Zoeland.
13 Wilson.

Class II.

1 Taylor.
2 Murdoch.
3 Deike.
3 Lester.
5 Hollis.
5 Livingstone.
5 Morrison.
5 Reid.
9 Day.
9 Harris.
9 Wagg.
12 Anderson.
13 Thomson.
13 Westgate.
15 Baird.

Class III.

1 McPhadden.
2 Robertson.
2 Zavitz.
4 Scott.
4 Tupper.
6 Mallory.
7 Mathison.
8 Ross, D.
9 Allison.
10 Baker.
11 Schooley.

Division "B."

Class II.

1 Gethen.
2 Cutler.

Class III.

1 McGregor.
2 Hutchinson.
3 Canning.
4 Gardiner.
5 Milburn.
6 Evoy.
6 Hodgson.
8 Fowler.
9 Calvert.
10 Golding.
10 Trueman.
12 Forbes.
13 Robertson, M.
14 McLaurin.

Ball.
Blyth.
Fitzgerald.
Boyd.
Law.
Wickham.

Chemistry.

Division "A."

Class I.

1 Price.
2 Marshall.

Class II.

1 Kennedy.
2 Anderson.
3 Jarvis, C.
4 Hume.
5 Raynor.

Class III.

1 Westgate.
2 Murdock.
2 Livingstone.
4 Day.
4 Deike.
6 Tozeland.
7 McPhadden.
7 Thomson.
9 Taylor.
9 Wilson.
11 Wagg.
12 Mathison.
12 Zavitz.
14 Hawke.
14 Mallory.
16 Reid.
17 Harris.
18 Jarvis, T.
19 Robertson, D. A.
20 Hammell.
20 Ross, D.
22 Allison.
22 Hollis.
24 Scott.
25 Morrison.
26 Baird.
26 Lester.
26 Snider.
26 Tupper.

Schooley.
Baker.

CLASS LISTS—EASTER EXAMINATIONS, 1897 *(Continued.)*

FIRST YEAR.

Chemistry.

Division "B."

Class III.

1 Canning.
2 Robertson.
3 Gethen.
4 Cutler.
5 Golding.
5 Hutchinson.
5 McLaurin.

Law.
Blyth.
Forbes.
Gardiner.
Bail.
Evoy.
Milburn.
Hodgson.
McGregor.
Clark.
Fowler.
Trueman.
Calvert.
Wickham.
Boyd.
Bunny.

Geology.

Division "A."

Class I.

1 Hume.
2 Jarvis, T.
3 Kennedy.
3 Price.
5 Raynor.
6 Hawke.
6 Jarvis, C.
6 Marshall.

Class II.

1 Anderson.
2 Hollis.
2 Wilson.
4 Deike.
4 Westgate.
6 Day.
6 Mallory.
8 Murdoch.

Class III.

1 Hammell.
1 Tozeland.
3 Livingstone.
4 Morrison.
5 Thomson.
6 Schooley.
7 McPhadden.
8 Snider.
9 Harris.
9 Reid.
11 Taylor.
12 Wagg.
12 Zavitz.
14 Robertson, D. A.
15 Baker.
16 Ross.
16 Tupper.
18 Lester.
19 Mathison.
20 Allison.
20 Baird.
22 Scott.

Division "B."

Class I.

1 Gethen.

Class II.

1 Hutchinson.
2 Cutler.
3 Canning.

Class III.

1 Calvert.
1 Robertson, M.
3 Fowler.
4 Blyth.
4 McLaurin.
6 McGregor.
7 Golding.
8 Evoy.
9 Hodgson.
10 Ball.
10 Clark.
10 Milburn.
13 Law.
13 Trueman.
15 Forbes.
16 Gardiner.

Boyd.
Wickham.
Fitzgerald.
Bunny.

Zoology.

Division "A."

Class I.

1 Hume.
1 Price.
3 Marshall.
4 Jarvis, C.
4 Kennedy.
6 Anderson.
6 Mallory.

Class II.

1 Jarvis.
2 Raynor.
3 Hammell.
4 Day.
4 Deike.
4 Lester.
7 Murdoch.
7 Wilson.
9 Thomson.

Class III.

1 Tozeland.
1 Westgate.
3 Zavitz.
4 Snider.
5 Hawke.
6 Baker.
7 Wagg.
8 Tupper.
9 Ross.
10 Harris.
11 Mathison.
12 Morrison.
12 McPhadden.
14 Robertson, D.
15 Taylor.
16 Reid.
17 Hollis.
18 Livingstone.
19 Schooley.
19 Scott.
21 Allison.
21 Baird.

Division "B."

Class II.

1 Hutchinson.

Class III.

1 Gethen.
2 Blyth.
3 Canning.
3 McLaurin.
5 Fowler.
6 Evoy.
7 Calvert.
8 Cutler.
8 Golding.
10 Hodgson.
11 Ball.
12 Gardiner.
13 Robertson, M.
14 Milburn.
15 McGregor.
16 Clark.
16 Law.
18 Forbes.

Trueman.
Wickham.
Bunny.
Boyd.

CLASS LISTS—EASTER EXAMINATIONS, 1897—(*Continued*).

FIRST YEAR.

Veterinary Anatomy.		Literature.		Grammar and
Division "A."	Division "B."	Division "A."	Division "B."	Division "A."
Class I.	*Class III.*	*Class I.*	*Class I.*	*Class I.*
1 Price.	1 Gethen.	1 Hume.	1 Law.	1 Hume.
	2 Canning.	2 Price.		2 Price.
	3 Milburn.	3 Hawke.		3 Anderson.
	4 Golding.			4 Kennedy.
Class II.	5 Robertson.		*Class II.*	5 Allison.
	6 Cutler.			6 Marshall.
1 Jarvis, C.	7 Hutchinson.	*Class II.*		7 Raynor.
Jarvis, T.	McLaurin.		1 Gethen.	Westgate.
3 Marshall.		1 Raynor.	2 Blyth.	
4 Raynor.		2 Marshall.		
Thompson.	———	Wagg.		*Class II.*
6 Kennedy.		4 Wilson.	*Class III.*	
7 Westgate.		5 Reid.		1 Wagg.
8 Tozeland.	McGregor.	6 Tozeland.		2 Morrison.
	Ball.	7 Anderson.	1 Canning.	Wilson.
Class III.	Gardiner.	8 Hammell.	2 Calvert.	Zavitz.
	Blyth.	9 Mallory.	3 Robertson, M.	5 Hawke.
	Evoy.	10 Westgate.	4 Fowler.	6 Deike.
	Trueman.	11 Kennedy.	5 Trueman.	7 Tozeland.
	Hodgson.		6 Evoy.	8 Hammell.
1 Day.	Calvert.		7 Ball.	Jarvis, C.
Livingstone.	Forbes.		8 McLaurin.	Taylor.
3 Hume.	Bunny.	*Class III.*	9 McGregor.	11 Jarvis, T.
Murdoch.	Boyd.		10 Cutler.	12 Lester.
5 Hawke.	Clark.	1 Allison.	Gardiner.	Schooley.
Taylor.	Fowler.	2 Mathison.	Golding.	14 Baker.
7 Anderson.	Fitzgerald.	3 Baird.	Hutchinson.	Mallory.
8 Mallory.	Switzer.	4 Livingstone.		Reid.
9 Wagg.	McKay.	Morrison.	———	
10 Tupper.	Law.	6 Zavitz.		
11 Hammell.	Avent.	7 Murdoch.	Clarke.	*Class III.*
Harris.	Wickham.	Snider.	Forbes.	
13 Matheson.		9 Harris.	Milburn.	1 Harris.
Robertson, D.		Scott.	Bunny.	2 Snider.
Snider.		11 Lester.	Boyd.	3 Hollis.
16 Wilson.		12 Taylor.	Hodgson.	4 Robertson, D.
17 Deike.		13 Deike.	Wickham.	5 Day.
Lester.		14 McPhadden.	Avent.	McPhadden.
19 Allison.		Ross.	Switzer.	Thomson.
Ross.		Tupper.	Millson.	8 Mathison.
Zavitz.		17 Jarvis, T.		Ross.
22 Morrison.		18 Jarvis, C.		10 Livingstone.
Reid.		19 Day.		11 Murdoch.
24 Baird.		20 Hollis.		12 Scott.
Hollis.		Robertson, D.		Tupper.
26 McPhadden.		Thomson.		14 Baird.
Scott.				
———		———		
Schooley.		Schooley.		
Baker.		Baker.		

CLASS LISTS—EASTER EXAMINATIONS, 1897—(*Continued*).

FIRST YEAR.

Composition.	Arithmetic.		Book-keeping.	
Division "B."	Division "A."	Division "B."	Division "A."	Division "B."
Class II.	*Class I.*	*Class I.*	*Class I.*	*Class I.*
1 Robertson, M.	1 Marshall. / Price.	1 Robertson, M.	1 Kennedy.	1 Canning.
Class III.	3 Kennedy.	*Class II.*	2 Price.	2 Fowler.
1 Gethen.	4 Hume.	1 Canning.	3 Allison.	*Class II.*
2 Golding.	*Class II.*	2 Hutchinson.	4 Hume.	1 McLaurin.
3 Clark.	1 Zavitz.	3 McLaurin.	5 Thomson.	2 Robertson, M.
4 Ball. / Blyth.	2 Allison.	*Class III.*	6 Tozeland.	*Class III.*
6 McLaurin.	3 Schooley.	1 Fowler.	7 Hawke. / Mallory.	1 Hutchinson.
7 Canning.	4 Westgate.	2 Boyd. / Trueman.	*Class II.*	2 Clark.
8 Law.	5 Anderson. / Raynor.	4 Law.	1 Raynor.	3. Calvert.
9 Trueman.	7 Mathison.	5 Cutler.	2 Deike. / Jarvis, C. / Westgate.	4 Blyth. / Gethen.
10 Fowler.	8 Tozeland.	6 Gardiner.	5 Anderson.	6 Gardiner.
11 Hutchinson.	9 Deike. / Murdoch.	7 Gethen.	6 Marshall. / Taylor. / Wagg. / Wilson.	7 Ball.
12 Cutler.	11 Mallory.	8 Golding.	10 McPhadden.	8 Boyd. / Cutler. / Evoy. / Golding. / McGregor. / Trueman.
13 Evoy.	12 Taylor.	9 Fitzgerald.	11 Zavitz.	
14 McGregor.	*Class III.*	10 Evoy.	*Class III.*	
Gardiner.	1 Harris. / Lester. / Wilson.	11 Clark. / Forbes.	1 Harris. / Tupper.	Hodgson.
Bunny. / Calvert.	4 McPhadden.	Wickham.	3 Lester.	Forbes.
Milburn.	5 Wagg.	Blyth. / McGregor. / Milburn.	4 Ross.	Wickham.
Hodgson.	6 Hawke.	Bunny.	5 Murdock.	Milburn.
Forbes.	7 Hollis.	Ball.	6 Reid.	Law.
Boyd.	8 Thomson.	Calvert.	7 Day. / Morrison.	Fitzgerald. / Switzer.
Wickham.	9 Livingstone.	Hodgson.	9 Hammell. / Mathison.	
Fitzgerald.	10 Morrison. / Robertson, D.		11 Scott.	
	12 Ross.		12 Schooley. / Snider.	
	13 Reid.		14 Jarvis, T.	
	14 Baird. / Hammell. / Snider.		15 Livingstone.	
	17 Day.		16 Hollis. / Robertson, D.	
	18 Jarvis, T.		18 Baird.	
	19 Scott,			
	20 Jarvis, C.			
	21 Tupper.			
Baker.	Baker.		Baker.	

CLASS LISTS EASTER EXAMINATIONS, 1897—(*Continued.*)

FIRST YEAR.

Drawing

Division "A."

Class I

1 Zavitz.
2 Anderson. Kennedy.
4 Hume.
5 Raynor.
6 Price. Westgate.
8 Deike. Jarvis, C.

Class II

1 Marshall.
2 Hawke. Tozeland.
4 Day.
5 Snider. Wagg.
7 Mathison. Thomson.
9 Wilson.
10 Allison.
11 Murdoch. Taylor.

Class III.

1 Robertson, D.
2 Lester.
3 Harris. Jarvis, T.
5 Mallory. Morrison.
7 Ross.
8 Hammell.
9 McPhadden.
10 Reid.
11 Hollis.
12 Baird. Livingstone. Scott. Tupper.

Schooley.
Baker.

Division "B."

Class II.

1 Hutchinson.
2 McLaurin.
3 Robertson, M.

Class III.

1 Cutler.
2 Canning.
3 Gethen.
4 Fowler.
5 Forbes. Trueman.
7 McGregor.
8 Evoy. Gardiner.
10 Golding.

Hodgson.
Ball.
Milburn. Wickham.
Blyth. Law.
Calvert.
Clark.
Boyd. Bunny.

Proficiency.

Division "A."

1 Price.
2 Hume.
3 Kennedy.
4 Marshall.
5 Raynor.
6 Anderson.
7 Jarvis, C. Tozeland.
9 Westgate.
10 Hawke.
11 Wilson, E. S.
12 Deike.
13 Zavitz.
14 Jarvis, T. Wagg.
16 Murdoch.
17 Mallory.
18 Thomson.
19 Taylor.
20 Day.
21 Hammell.
22 Harris.
23 Lester.
24 Snider.
25 Allison.
26 Morrison.
27 Reid.
28 Mathison.
29 Livingstone.
30 McPhadden.
31 Ross, D.
32 Hollis.
33 Robertson, D.
34 Tupper.
35 Baird.
36 Scott, N. C.

Division "B."

1 Canning.
2 Gethen.
3 Hutchinson.
4 Robertson, M.
5 McLaurin, J. D.
6 Cutler.
7 Golding.

CLASS LISTS.—EASTER EXAMINATIONS, 1897—(*Continued.*)—SECOND YEAR

Agriculture.

Class I.

1 Craig, R. D.
2 Ross, H. R.
3 Summerby, W. L.

Class II.

1 McCalla, G. B.
2 Lucas, W. T.
3 Davis, A. N.
3 Fairweather, F. H.
5 Beam, E.
6 Heartz, W. B. G.
6 Rose, M.
8 Squirrell, W. J.

Class III.

1 Reade, J. M.
2 Lloyd-Jones, T.
3 McKinley, W. W.
4 Clark, J. H.
5 Ross, N.
6 Morgan, G. W.
7 Winchester, G.
8 Mooney, J. A.
9 West, A. W.
10 Richardson, E. L.
11 McMillan, M. J.
12 Nicholson, R. G.

Whigham, R. D.
Balfour, T. B.

Judging Cattle.

Class I.

1 Clark.
2 Morgan.
3 Beam.
4 Mooney.
5 Lloyd-Jones.
6 Fairweather.
7 McKinley.
8 Lucas.
8 McCalla.
10 Ross, H.
11 Davis.
11 Reade.
13 Craig.

Class II.

1 Ross, M.
1 Summerby.
2 Ross, N.
4 Nicholson.
5 Heartz.
6 West.
7 Winchester.

Class III.

1 Squirrell.
2 Balfour.
3 McMillan.
4 Whigham.
5 Richardson.

Judging Sheep.

Class I.

1 Clark.
2 Lloyd-Jones.
3 Beam.
4 Fairweather.
5 Mooney.
6 Ross, H.
7 Morgan.
7 McCalla.
9 Lucas.
9 McKinley.

Class II.

1 Davis.
2 Craig.
2 Reade.
4 Ross, M.
5 Heartz.
6 Ross, N.
7 Summerby.
7 Winchester.

Class III.

1 McMillan.
2 Squirrell.
3 West.
4 Whigham.
5 Nicholson.
6 Balfour.
7 Richardson.

Poultry.

Class I.

1 Balfour.
2 Heartz.
3 Beam.
4 Craig.
5 Lucas.
5 Richardson.

Class II.

1 Morgan.
2 Davis.
3 McCalla.
4 Lloyd-Jones
4 Reade.
6 Mooney.
6 Ross, N.
8 Clark.
8 Nicholson.
10 McMillan.
11 Fairweather.
11 Summerby.
11 West.
14 Ross, M.
15 Winchester.
16 Ross, H. R.

Class III.

1 McKinley.
2 Squirrell.
3 Whigham.

Agricultural Chemistry.

Class I.

1 Summerby.
2 Craig.
3 McCalla.
4 Heartz.

Class II.

1 Lucas.
2 Beam.
3 Reade.
4 Ross, N.

Class III.

1 Davis.
2 McMillan.
3 Ross, H. R.
4 Clark.
4 Ross, M.
6 Squirrell.
7 Lloyd-Jones.
8 McKinley.
9 Fairweather.
9 Robertson.
11 Morgan.
12 Richardson.
13 West.
14 Nicholson.
15 Mooney.
16 Winchester.

Balfour.
Whigham.

Vegetable Histology. (Optional.)

Class I.

1 Reade.
1 Ross, M.
3 Craig.
4 McCalla.
4 Ross, N.

Class II.

1 Davis.
2 Ross, H.

Class III.

1 Summerby.
2 Heartz.
3 Robertson, T. H.
4 Elliott.

Winchester.
Nicholson.
Richardson.

Horticulture.

Class I.

1 McCalla.
2 Craig.
3 Fairweather.

Class II.

1 Reade.
2 Ross, H. R.
3 Beam.
4 Lucas.
5 Summerby.
6 Heartz.
7 Clark.
7 Ross, M.
9 McKinley.
10 Ross, N.

Class III.

1 Squirrell.
2 Davis.
3 Lloyd-Jones.
4 Winchester.
5 Mooney.
5 Richardson.
7 Balfour.
8 McMillan.
9 West.
10 Morgan.

Nicholson.
Whigham.

CLASS LISTS.—EASTER EXAMINATIONS, 1897—(*Continued.*)—SECOND YEAR.

Veterinary Pathology.	Practical Horse.	Literature.	Essays.	Political Economy.	Physics.	German. (Optional.)	Proficiency.
Class I.	*Class I.*	*Class I.*	*Class I.*	*Class I.*	*Class I.*	*Class I.*	
1 Craig.	1 Ross, M.	1 McCalla.	1 Ross, H.	1 McCalla.	1 Craig.	1 Summerby.	1 Craig.
2 Beam.	2 Clark.	2 Craig.	2 McCalla.	2 Craig.			2 McCalla.
3 Clark.	3 Ross, N.	3 Ross, H. R.	3 Summerby.	3 Ross, M.	*Class II.*	*Class II.*	3 Summerby.
4 McCalla.				4 McKinley.	1 Summerby.	1 Craig.	4 Ross, H. R.
	Class II.	*Class II.*	*Class II.*		2 McCalla.	2 Reade.	5 Reade.
Class II.	1 Summerby.	1 Summerby.	1 Heartz.	*Class II.*	3 Reade.		6 Beam.
1 Ross, N.	2 Morgan.	2 Ross, N.	2 Ross, N.	1 Ross, H.	4 Ross, N.	*Class III.*	7 Ross, N.
2 Heartz.	3 West.		3 {Beam. Ross, M.}	2 Summerby.	5 {Fairweather. Heartz.}	1 McCalla.	8 Clark.
3 Ross, H. R.		*Class III.*	5 Craig.	3 Reade.	7 {Beam. Clark.}		9 Heartz.
4 Lucas.	*Class III.*	1 Beam.	6 Clark.	4 {Fairweather. Heartz.}			10 Ross, M.
5 West.	1 Reade.	2 Reade.	7 McKinley.	6 Beam.	*Class III.*		11 Lucas.
6 Ross, M.	2 Craig.	3 {Fairweather. Heartz.}			1 {Lloyd-Jones. Ross, H.}		12 Fairweather.
7 Summerby.	3 Lloyd-Jones.	5 Lucas.	*Class III.*	*Class III.*	3 {Davis. Lucas.}		13 Davis.
	4 Lucas.	6 Richardson.	1 Morgan.	1 Richardson.	5 {McKinley. Richardson.}		14 McKinley.
Class III.	5 Mooney.	7 {Clark. McKinley. Ross, M.}	2 Mooney.	2 Lucas.	7 Mooney.		15 Lloyd-Jones.
1 Reade.	6 {Davis. McCalla.}	10 Davis.	3 Richardson.	3 Clark.	8 Ross, M.		16 Mooney.
2 Fairweather.	8 Whigham.	11 Lloyd-Jones.	4 Lucas.	4 Lloyd-Jones.	9 Squirrell.		17 Squirrell.
3 McKinley.	9 Nicholson.	12 West.	5 Fairweather.	5 Ross, N.	10 McMillan.		18 West.
4 Davis.	10 Beam.	13 Robertson, T. H.	6 {Davis. Reade. Winchester.}	6 West.	11 West.		19 Richardson.
5 {Mooney. Winchester.}	11 Ross, H.	14 Winchester.	9 Elliott.	7 Davis.	12 {Morgan. Nicholson. Winchester.}		20 Winchester.
7 Lloyd-Jones.	12 McMillan.	15 {McMillan. Squirrell.}	10 {Lloyd-Jones. Whigham.}	8 Squirrell.			21 McMillan.
8 Morgan.	13 Winchester.	17 Nicholson.	12 {McMillan. Balfour.}	9 McMillan.			Elliott.
9 Richardson.	14 Heartz.	18 Mooney.	14 {Squirrell. West.}	10 Mooney.			(ægrotat)
10 Nicholson.	15 Balfour.			11 Winchester.			
11 {Balfour. McMillan.}	16 {Fairweather. McKinley.}	Morgan.	Nicholson.	12 {Morgan. Nicholson.}	Whigham.		
13 Squirrell.	18 Richardson.	Whigham.			Balfour.		
14 Whigham.	19 Squirrell.	Balfour.		Balfour. Whigham.			

CLASS LISTS—MIDSUMMER EXAMINATIONS, 1897.—FIRST YEAR.

Agriculture.

Division "A."

Class I.

1 Raynor.
2 Hume.
2 Kennedy.
5 Price.
5 Wagg.
6 Marshall.

Class II.

1 Harris.
2 Taylor.
3 Hawke.
3 Tozeland.
5 Lester.
5 Westgate.
7 Thomson.
8 Snider.
9 Murdoch.
10 Reid.
11 Wilson.
12 Brokovski.
13 Morrison.
13 Ross.

Class III.

1 Day.
2 Jarvis, C.
3 Anderson.
4 McPhadden.
5 Schooley.
6 Livingstone.
7 Mallory.
8 Jarvis, T.
9 Hammell.
9 Tupper.
11 Deike.
12 Robertson, D.A.
13 Zavitz.
14 Hollis.
15 Scott, N. C.
15 Allison.

Division "B."

Class III.

1 Evoy.
2 Hutchinson.
3 Canning.
4 Gardiner.
4 McLaurin.
6 Trueman.
7 McFiggins.
8 Robertson, M.
9 Standly.
10 Cutler.
10 Meyer.
12 Avent.
12 Blyth.
12 McGregor.

Forbes.
Hodgson.
Boyd.
Clark.
Eagle.
Milburn.
McKay.
*Golding.
Fitzgerald.
*Fowler.
Robinson, F. H.
Ball.
Law.
Bunny.
Durlac.
Calvert.
Gzowski.

Dairying.

Division "A."

Class I.

1 Hume.
2 Kennedy.
3 Day.
4 Wagg.
5 Jarvis, C.
6 Raynor.
7 Thomson.
8 Taylor.
9 Snider.
10 Mallory.
11 Livingstone.
12 Hawke.
12 Marshall.
14 McPhadden.
15 Price.

Class II.

1 Hammell.
2 Tozeland.
3 Lester.
3 Murdoch.
5 Zavitz.
6 Tupper.
6 Ross, D.
8 Scott.
9 Anderson.
10 Westgate.
11 Schooley.

Class III.

1 Hollis.
2 Harris.
3 Reid.
4 Jarvis, T.
5 Morrison.
6 Wilson.
7 Brokovski.
8 Allison.
9 Robertson, D.
10 Deike.

Division "B."

Class II.

1 Canning.
2 Blyth.

Class III.

1 Evoy.
2 Cutler.
3 Gardiner.
4 McLaurin.
5 Hodgson.
5 McKay.
7 Ball.
8 Robertson, M
9 Calvert.
10 Forbes.
11 Meyer.
12 Hutchinson.
12 McGregor.
14 Bunny.
Avent.
Boyd.
15 Eagle.
Milburn
Trueman.

Fitzgerald.
Robinson, F. H.
McFiggins.
Standly.
Clark.
Durlac.
Law.
Gzowski.

*Did not write on final.

CLASS LISTS—MIDSUMMER EXAMINATIONS, 1897.—*Continued.*—FIRST YEAR.

Poultry.

Division "A."	Division "B."
Class I.	*Class III.*
1 Jarvis, C.	1 Canning.
2 Jarvis, T.	1 Cutler.
3 Mallory.	1 Hutchinson.
4 Kennedy.	1 Standly.
Class II.	5 McFiggins.
1 Snider.	6 Hodgson.
2 Marshall.	7 Evoy.
3 Price.	8 McKay.
4 Hammell.	9 Milburn.
4 Raynor.	
6 Wilson.	Ball.
7 Hume.	Calvert.
7 Thomson.	Meyer.
9 Tupper.	McGregor.
10 Anderson.	Robertson, M
	Durlac.
Class III.	Gardiner.
	Eagle.
1 Scott.	Fitzgerald.
2 Taylor.	Bunny.
3 Day.	
3 Hawke.	
5 Deike.	
6 Morrison.	
6 Murdoch.	
8 Livingstone.	
8 McPhadden.	
10 Tozeland.	
11 Harris.	
12 Westgate.	
13 Hollis.	
13 Brokovski.	
15 Lester.	
15 Ross, D.	
15 Zavitz.	
18 Wagg.	
19 Allison.	
20 Reid.	
21 Robertson, D.	
Schooley.	

Bee-Keeping.

Division "A."	Division "B."
Class I.	*Class I.*
1 Hume.	1 Hutchinson.
1 Jarvis, C.	*Class II.*
1 Rayner.	1 Hodgson.
4 Jarvis, T.	*Class III.*
4 Hawke.	1 Avent.
6 Kennedy.	2 McLaurin.
6 Thomson.	3 Trueman.
8 Hammell.	4 Evoy.
9 Murdoch	5 Blyth.
10 Mallory.	5 Canning.
Class II.	7 Robertson.
1 Zavitz.	8 Clark.
2 McPhadden.	9 Gardiner.
2 Lester.	9 Cutler.
2 Marshall.	McKay.
5 Brokovski.	Meyer.
5 Snider.	McGregor.
7 Reid.	McFiggins.
7 Westgate.	Forbes.
9 Wagg.	Robinson.
10 Price.	Standly.
Class III.	Calvert.
1 Taylor.	Milburn.
2 Day.	Eagle.
3 Deike.	Boyd.
4 Anderson.	Bunny.
4 Tozeland.	Fitzgerald.
6 Livingstone.	Law.
6 Scott.	Durlac.
8 Hollis.	Ball.
8 Ross.	Gzowski.
10 Schooley.	
11 Harris.	
11 Allison.	
13 Tupper.	
13 Wilson.	
15 Morrison.	
15 Robertson.	

Botany.

Division "A."	Division "B."
Class I.	*Class II.*
1 Hume.	1 Canning.
2 Kennedy.	*Class III.*
2 Raynor.	1 Hutchinson.
4 Price.	2 Cutler.
5 Jarvis, C.	2 Meyer.
Class II.	4 Robertson.
1 Hammell.	5 McLaurin.
1 Zavitz.	6 Avent.
3 Marshall.	7 Law.
4 Westgate.	7 McFiggins.
5 Anderson.	7 Trueman.
6 Hawke.	10 Ball.
6 Mallory.	10 Clark.
8 Deike.	10 Milburn.
8 Jarvis, T.	13 Forbes.
8 Morrison.	14 Gardiner.
11 Tozeland.	14 Hodgson.
Class III.	16 McKay.
	16 Evoy.
1 Reid.	McGregor.
1 Thomson.	Robinson.
1 Wilson.	Standly.
4 Harris.	Boyd.
4 Livingstone.	Eagle.
4 Wagg.	Durlac.
7 Hollis.	Calvert.
7 Murdoch.	Bunny.
9 Taylor.	Fitzgerald.
10 McPhadden	Gzowski.
11 Brokovski.	
11 Ross.	
13 Snider.	
14 Day.	
15 Allison.	
16 Tupper.	
17 Schooley.	
18 Lester.	
19 Robertson.	
19 Scott.	

CLASS LISTS—MIDSUMMER EXAMINATIONS, 1897.—*Continued*—
FIRST YEAR.

Materia Medica.

Division "A."	Division "B."
Class I.	*Class III.*
1 Jarvis, C.	1 Canning.
2 Price.	2 Blyth.
3 Hume.	3 Ball.
3 Livingstone.	3 Hutchinson.
	3 McLaurin.
Class II.	6 Avent.
1 Marshall.	6 Bunny.
2 Jarvis, T.	6 Robertson.
3 Day.	9 Calvert.
	9 Evoy.
Class III.	9 Milburn.
1 Thomson.	
2 Kennedy.	McKay.
3 Anderson.	Cutler.
3 Hawke.	Forbes.
3 Raynor.	McGregor.
6 Ross.	Hodgson.
7 Harris.	Clark.
8 McPhadden.	Eagle.
9 Murdoch.	Meyer.
9 Tozeland.	Standly.
9 Westgate.	Trueman.
12 Hammell.	Law.
12 Morrison.	McFiggins.
14 Lester.	Boyd.
15 Taylor.	Gardiner.
15 Tupper.	Fitzgerald.
17 Wilson.	Robinson.
18 Deike.	Durlac.
19 Snider.	
20 Robertson.	
21 Zavitz.	
22 Brokovski.	
23 Reid.	
23 Mallory.	
25 Wagg.	
26 Scott.	
26 Hollis.	
26 Schooley.	
26 Allison.	

Literature.

Division "A."	Division "B."
1 Hume.	1 Blyth.
Class II.	*Class III.*
1 Price.	1 Robertson.
2 Raynor.	2 Trueman.
3 Wagg.	3 Evoy.
4 Marshall.	4 Gardiner.
5 Lester.	5 Ball.
	6 Canning.
Class III.	6 Hutchinson.
1 Deike.	6 Meyer.
1 Kennedy.	
1 Reid.	
4 Hawke.	McLaurin.
5 Mallory.	Robertson.
5 Wilson.	Durlac.
7 Anderson.	Avent.
8 Hammell.	Cutler.
8 Westgate.	Forbes.
10 Scott	Law.
11 Morrison.	Milburn.
12 Jarvis, C.	Clark.
13 Tozeland.	Gzowski.
14 Murdoch.	McKay.
15 Day.	Calvert.
15 Livingstone.	Standly.
15 Snider.	Golding.
18 Hollis.	McFiggins.
19 Harris.	Bunny.
19 Ross.	McGregor.
21 Zavitz.	Boyd.
21 Tupper.	Hodgson.
23 Jarvis, T.	Fitzgerald.
23 McPhadden.	Eagle.
25 Allison.	
25 Taylor.	
27 Robertson.	
27 Thomson.	
27 Brokovski.	
Schooley.	

Grammar and Composition.

Division "A."	Division "B."
Class I.	*Class II.*
1 Hume.	1 Canning.
2 Hawke.	2 Robertson.
3 Kennedy.	
4 Price.	*Class III.*
4 Wagg.	1 Meyer.
6 Raynor.	2 McLaurin.
7 Anderson.	3 Blyth.
7 Taylor.	4 Robinson.
9 Zavitz.	5 Ball.
	6 Cutler.
Class II.	7 Trueman.
1 Marshall.	8 Law.
2 Westgate.	8 McGregor.
3 Wilson.	10 Clark.
4 Jarvis, C.	10 Evoy
4 Murdoch.	10 Hutchinson.
6 Brokovski.	
6 Mallory.	
8 Thomson.	Avent.
8 Tozeland.	Bunny.
10 Allison.	McFiggins.
10 Deike.	Forbes.
10 Hammell.	Gzowski.
	Milburn.
Class III.	Gardiner.
1 Morrison.	Durlac.
2 Day.	McKay.
3 Harris	Calvert.
3 Jarvis, T.	Boyd.
5 Robertson.	Standly.
6 Lester.	Hodgson.
6 Snider.	Fitzgerald.
7 Reid.	Eagle.
7 Ross.	
10 Hollis.	
10 McPhadden.	
12 Livingstone.	
13 Scott.	
14 Tupper.	
15 Schooley.	

CLASS LISTS—MIDSUMMER EXAMINATIONS, 1897.—*Continued.*—FIRST YEAR.

Arithmetic and Mensuration.

Division "A."

Class I.

1 Kennedy.
1 Price.
3 Hume.
4 Marshall.
5 Westgate.
6 Taylor.
7 Anderson.
7 Zavitz.

Class II.

1 Raynor.
1 Wagg.
3 Deike.
3 Thomson.
5 Murdock.
6 Tozeland.
7 Mallory.

Class III.

1 Brokovski.
2 Lester.
3 Harris.
4 Allison.
5 Schooley.
6 Hammell.
6 Hawke.
8 Morrison.
9 Jarvis, C.
9 Wilson.
11 Day.
12 Reid.
13 McPhadden.
14 Robertson.
15 Snider.
16 Hollis.
16 Livingstone.
18 Jarvis, T.
18 Ross.
18 Scott.
18 Tupper.

Division "B."

Class III.

1 Robertson.
2 Hutchinson.
3 Canning.
4 Gzowski.
5 McLaurin.
6 Gardiner.
7 Cutler.
7 Robinson.

Trueman.
Hodgson.
Forbes.
Fitzgerald.
Milburn.
Evoy.
McFiggins.
McKay.
Ball.
McGregor.
Boyd.
Blyth
Durlac.
Law.
Meyer.
Clark.
Avent.
Bunny.
Standly.
Calvert.
Eagle.

Midsummer Proficiency.

Division "A."

1 Hume.
2 Kennedy.
3 Price.
4 Raynor.
5 Jarvis, C.
6 Marshall.
7 Hawke.
8 Thomson.
9 Wagg.
10 Mallory.
11 Anderson.
12 Taylor.
12 Westgate.
14 Hammell.
15 Jarvis, T.
15 Murdoch.
17 Tozeland.
18 Zavitz.
19 Day.
19 Snider.
21 Lester.
22 Wilson.
23 Livingstone.
24 McPhadden.
25 Deike.
26 Harris.
27 Reid.
28 Morrison.
29 Brokovski.
30 Ross, D.
31 Tupper.
32 Hollis.
33 Allison.
34 Robertson, D.

Division B.

1 Canning.
2 Hutchinson.
3 Robertson.
4 McLaurin.

Proficiency for year.

Division "A."

1 Price.
2 Kennedy.
3 Raynor.
4 Marshall.
5 Anderson.
6 Jarvis, C.
7 Hawke.
8 Westgate.
9 Tozeland.
10 Taylor.
11 Wagg.
12 Zavitz.
13 Mallory.
14 Thomson.
15 Jarvis, T.
16 Murdoch.
17 Deike.
18 Wilson.
19 Snider.
20 Day.
22 Hammell.
22 Harris.
23 Lester.
24 Morrison.
25 Livingstone.
26 McPhadden.
27 Allison.
28 Reid.
29 Ross, D.
30 Hollis.
31 Tupper.
32 Robertson, D.

The following have passed in all subjects necessary to receive first year standing.

Canning.
Hume.
Hutchinson.
McLaurin.
Robertson, M.

CLASS LISTS—MIDSUMMER EXAMINATIONS, 1897.—*Continued.*

SECOND YEAR.

Agriculture.

Class I.

1 Heartz.
2 Craig.
3 Ross, H.
4 Clark.

Class II.

1 Beam.
2 McCalla.
3 Ross, M.
4 Lucas.
5 Fairweather.
6 Davis.
7 Summerby.
8 Reade.
9 Ross, N.
10 Mooney.

Class III.

1 Lloyd-Jones.
2 Winchester.
3 Morgan.
4 McKinley.
5 Elliott.
6 Richardson.
7 McMillan.
8 West.
9 Squirrell.
10 Nicholson.

Failed.

Whigham.
Balfour.

Dairying.

Class I.

1 Ross, H.
2 Clark.
3 Davis. / McCalla.
5 Craig.
6 Beam. / Heartz.
8 Summerby.

Class II.

1 Fairweather
2 Ross, M.
3 Reade.
4 Mooney.
5 Elliott.
6 Lucas.
7 McKinley. / West.

Class III.

1 Squirrell.
2 Ross, M.
3 McMillan.
4 Lloyd-Jones.
5 Richardson.
6 Morgan.
7 Nicholson. / Whigham.
9 Balfour. / Winchester.

Poultry.

Class I.

1 Balfour.
2 Nicholson.
3 McCalla. / Reade. / Ross, M.
6 Lucas. / Morgan.
8 Heartz. / Lloyd-Jones. / Richardson. / Ross, H.

Class II.

1 Beam. / Clark.
3 Craig.
4 McKinley.
5 Elliott. / Summerby.
7 Mooney. / Squirrell. / West. / Winchester.

Class III.

1 Davis. / Fairweather.
3 Ross, N.
4 Whigham.
5 McMillan.

Bee-keeping.

Class I.

1 Ross, M.
2 McKinley.
3 Beam. / Craig.
5 Fairweather.
6 McCalla.
7 Elliott. / Ross, N.
9 Clark. / Lucas.
11 Ross, H. / Summerby.

Class II.

1 Davis.
2 Richardson.
3 McMillan. / Reade.

Class III.

1 Lloyd-Jones.
2 Morgan.
3 Heartz.
4 Nicholson.
5 Balfour. / West.
7 Mooney. / Winchester.
9 Whigham.
10 Squirrell.

Practical Chemistry.

Class I.

1 Summerby.
2 Craig.
3 Heartz.
4 Reade.

Class II.

1 Beam. / Lucas.
3 Ross, H.
4 McCalla.
5 Ross, N.

Class III.

1 Clark.
2 McMillan.
3 Fairweather.
4 Davis.
5 Elliott.
6 Nicholson.
7 Squirrell.
8 Ross, M.
9 West.
10 Lloyd-Jones. / Winchester.
12 Mooney. / Richardson.
14 Morgan / McKinley.

Whigham.
Balfour.

CLASS LISTS—MIDSUMMER EXAMINATIONS, 1897.—*Continued.*

SECOND YEAR.

Agricultural Chemistry.	Botany.	Horticulture.	Veterinary Obstetrics.	Literature.
Class I.	*Class* I.	*Class* I.	*Class* I.	*Class* I.
1 Craig.	1 Craig.	1 McCalla.	1 Craig.	1 Craig.
2 Heartz.	2 McCalla.	2 Ross, M.	2 McCalla.	2 McCalla.
	3 Ross, N.	3 Reade.	3 Ross, H.	3 Summerby.
Class II.		4 McKinley.	4 Clark.	4 Ross, M.
1 Reade.	*Class* II.	5 Craig.	4 Heartz.	
2 McCalla.	1 Ross, H.		6 McKinley.	*Class* II.
3 Ross, H.	2 Summerby.	*Class* II.		1 Ross, H.
	3 Ross, M.	1 Davis.	*Class* II.	2 Reade.
Class III.	3 Reade.	2 Ross, H.	1 Davis.	3 Beam.
1 Beam.		3 Elliott.	1 Fairweather.	4 Ross, N.
2 Summerby.	*Class* III.	4 Beam.	3 Summerby.	5 Heartz.
3 Clark.	1 Beam.	4 Lucas.	4 Ross, N.	
4 Ross, M.	1 Lucas	6 Fairweather.	5 Ross, M.	*Class* III.
5 Lucas.	3 Heartz.	7 Summerby.		1 McKinley.
5 Ross, N.	4 Davis.	7 Mooney.	*Class* III.	2 Clark.
7 Robertson.	5 Clark.	9 Ross, N.	1 Reade.	3 Elliott.
8 Richardson.	6 McKinley.	10 Clark.	2 Lucas.	4 Davis.
9 McKinley.	7 Elliott.		3 Beam.	5 Lloyd-Jones.
10 Davis.	8 Nicholson.	*Class* III.	4 Winchester.	6 Robertson.
10 West.	9 Fairweather.	1 Richardson.	5 Richardson.	7 Morgan.
12 Squirrell.	10 Morgan.	2 Heartz.	6 Elliott.	8 Fairweather.
13 Fairweather.	11 McMillan.	3 Squirrell.	6 Lloyd-Jones.	9 Squirrell.
14 Lloyd-Jones.	12 Lloyd-Jones.	4 West.	8 Morgan.	10 Lucas.
15 Morgan.	12 Richardson.	4 Balfour.	9 Mooney.	11 Richardson.
16 McMillan.	14 Squirrell.	6 Winchester.	10 West.	12 Mooney.
17 Mooney.	15 West.	7 Morgan.	11 Nicholson.	
17 Winchester.	16 Mooney.	8 Lloyd-Jones.	12 McMillan.	
19 Elliott.	17 Winchester.	9 McMillan.	13 Squirrell.	
19 Nicholson.			14 Whigham.	Whigham.
			15 Balfour.	Winchester.
	Balfour.	Nicholson.		McMillan.
Balfour.		Whigham.		Nicholson.
Whigham.				West.
				Balfour.

CLASS LISTS—MIDSUMMER EXAMINATIONS, 1897—*Concluded.*

SECOND YEAR

Theses.	Electricity.	Midsummer proficiency.	Proficiency for year.
Class I.	*Class* I.	1 Craig.	1 Craig.
1 Craig.	1 Craig.	2 McCalla.	2 McCalla.
2 Elliott.	2 Summerby.	3 Summerby.	3 Summerby.
2 Reade.		4 Ross, H.	4 Ross, H.
Class II.	*Class* II.	5 Heartz.	5 Reade.
1 Beam.	1 Ross, M.	6 Reade.	6 Beam.
1 McCalla.	2 Elliott.	7 Beam.	7 Heartz.
3 Summerby.	3 Beam.	8 Ross, M.	8 Lucas.
4 Nicholson.	4 Ross, H.	9 Clark.	9 Ross, M.
5 Ross, N.	5 Reade.	10 Ross, N.	10 Ross, N.
6 Heartz.		11 Lucas.	11 Davis.
6 Winchester.	*Class* III.	12 Davis.	12 Fairweather.
Class III.	1 Heartz.	13 Elliott.	13 Lloyd-Jones.
1 Clark.	2 Ross, N.	13 McKinley.	14 Mooney.
1 Richardson.	3 Clark.	15 Fairweather.	15 Squirrell.
3 McKinley.	4 McCalla.	16 Lloyd-Jones.	
4 Davis.	5 Fairweather.	17 Richardson.	
5 Ross, N.	5 Robertson.	18 Morgan.	
6 Lloyd-Jones.	6 McKinley.	19 Mooney.	
7 Lucas.	7 Lucas.	20 Squirrell.	
8 Balfour.	8 Davis.		
9 Fairweather.	9 Lloyd-Jones.		
9 Squirrell.	10 Morgan.		
11 McMillan.	10 McMillan.		
11 West.	12 Richardson.		
Valedictory.	13 Mooney.		
Ross, H.	13 Winchester.		
Morgan.	13 Squirrell.		
Mooney.	Whigham.		
	West.		
	Nicholson.		
	Balfour.		

DAIRY SCHOOL STUDENTS' CLASS LISTS.— GENERAL PROFICIENCY, 1897.

Class I.

1 Gracey, A. E.
2 Dangerfield, J. A.
3 Wyles, W. J.
4 Pettapiece, W. M.

Class II.

1 Smith, F. W.
2 Flack, Samuel.
3 Murphy, W. H.
4 Andrus, E.
5 Nunn, J. W.
6 McFeeters, J. A.
7 Kennedy, H.
8 Menzies, G.
9 Scott, D. M.
10 Black, G. W.
11 Wilson, J. A.

Class II.—Continued.

12 Thomson, F. A.
13 { Munro, W.
{ Patterson, J.
15 Reynolds, H. E.
16 Thomas, J.
17 Pyke, H. R.

Class III.

1 Boyes, F.
2 Haines, H.
3 { Lipsit, J. B.
{ Patterson, H.
5 Sheppard, —.
6 Servage, J. D.
7 Anderson, G. A.
8 Graham, W. G.

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